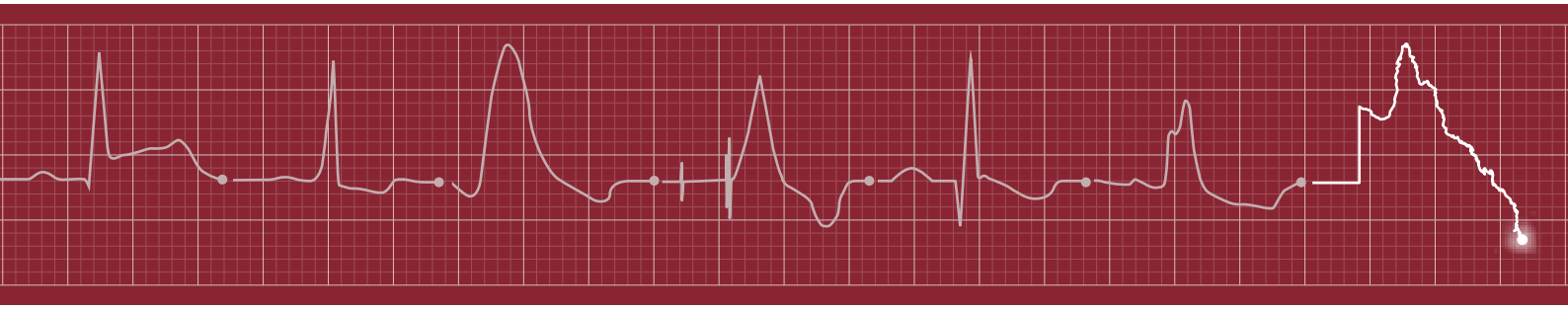
Statewide Cardiac Clinical Network

Queensland Cardiac Outcomes Registry

2020 Annual Report

Cardiac Rehabilitation Audit



Queensland Cardiac Outcomes Registry 2020 Annual Report

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1 Foreword

Dr John Wakefield PSM
Director-General
Queensland Health

I am pleased to present the Queensland Cardiac Outcomes Registry (QCOR) 2020 Annual Report. The Annual Report provides a detailed audit of six clinical services spanning cardiac and thoracic interventions and surgeries to outpatient services for patients dealing with this complex chronic disease.

The Report also analyses the effect of the COVID-19 pandemic on cardiac services. Whilst there have been many challenges, it is evident that the resilient nature of cardiac clinicians has shone through with service volumes continuing to experience growth or modest variation in case numbers. The report also begins to examine the positive impact of the implementation of the Networked Cardiac Care model for coordination and outreach services in regional and remote Queensland. We can now measure and monitor the effect and outcome of investment into preventative and specialist medical care provided close to home.

Queensland Health is committed to empowering our people to provide the best possible healthcare, to be transparent in our work and importantly use information to inform and improve the health outcomes of our patients. It is pleasing to see this Report evolve and adapt to the needs of its stakeholders year-on-year.

Clinical engagement has continued to extend beyond clinical practice, where procurement activities for clinical consumable items has resulted in significant cost savings. The utilisation of QCOR data has been at the crux of these initiatives, empowering clinicians and administrators to confidently negotiate better value for money for high-cost, high-volume prostheses.

QCOR data has allowed health services to be responsive to the needs of patients and community. It is actively used to inform how we improve the access, equity, safety, efficiency, and effectiveness of cardiac healthcare.

I would like to acknowledge the ongoing effort of the Statewide Cardiac Clinical Network and the ongoing commitment and dedication of our hard-working clinicians and teams across Queensland who have collaborated to produce this Annual Report.

2 Message from the SCCN Chair

This sixth QCOR Annual Report once again underpins the importance of data in ensuring quality outcomes in healthcare. The COVID-19 pandemic has also underscored how reliant we are on data to inform decision making and to monitor service delivery. To date, Queensland public health services have been spared in comparison to interstate and international services. Nonetheless, clinicians have collaborated to prepare for a staged, whole-system approach, should it be required, to ensure consistency of service delivery. QCOR data has supported these processes.

QCOR has continued to expand its breadth including a new module to support cardiac outreach services. Outreach services are an integral part of delivering quality care to patients for whom cardiac care is less accessible, due to their remoteness from traditional facility-based services. These models of care were embraced throughout the 2020 COVID-19 pandemic due to travel restrictions and lockdowns necessitating services to adapt to maintain high levels of clinical care. QCOR's analysis of this program highlights the investment and efforts of clinicians to ensure the best possible care is provided regardless of distance and location.

This year we welcome the contribution of quality data and outcomes from the Queensland Paediatric Cardiac Service. Initially focusing on paediatric cardiac surgery this small, highly specialised community perform high risk, low volume procedures requiring expert levels of evaluation and contextualisation. The database will provide a unique platform for population-based studies. It will also lay the foundation for long-term outcome studies in a local population.

It is again reassuring to see Queensland cardiac services performing strongly against, often-aspirational, targets, even in the face of an uncertain healthcare landscape. An unwavering commitment to clinical quality has seen the registry continue to evolve including the review and adjustment of clinical indicators across all areas of interest.

QCOR data has continued to underpin clinician-led, bulk purchase arrangements and subsequent savings for the purchase of cardiac prostheses. This data has informed the process and outcomes of the initiative resulting in over $3.8 million per annum savings across coronary stents and balloons, cardiac pacemakers, defibrillators and implantable loop recorders. The program has demonstrated the value of QCOR and its ability to not only support improved clinical outcomes but deliver significant efficiencies to the organisation that enable cost savings and reinvestment into front line services and new technologies. This program provides a template for other areas of the public health system to emulate.

The many dedicated staff involved in cardiac services throughout all of Queensland should be applauded, not only for their commitment to delivering quality clinical outcomes but for their willingness to collaborate, continually review, adapt and improve.

Dr Rohan Poulter and Dr Peter Stewart
Co-chairs, Statewide Cardiac Clinical Network

3 Introduction

The Queensland Cardiac Outcomes Registry (QCOR) is an ever-evolving clinical registry and quality program established by the Statewide Cardiac Clinical Network (SCCN) in partnership with statewide cardiac clinicians and made possible through the funding and support of Clinical Excellence Queensland. QCOR provides access to quality, contextualised clinical and procedural data to inform and improve patient care and support quality improvement activities across cardiac and cardiothoracic surgical services in Queensland.

QCOR is a clinician-led program, and the strength of the Registry would not be possible without this input. The Registry is governed by clinical committees providing direction and oversight over Registry activities for each cardiac and cardiothoracic specialty area, with each committee reporting to the SCCN and overarching QCOR Advisory Committee. Through the QCOR committees, clinicians are continually developing and shaping the scope of the Registry based on contemporary best practices and the unique requirements of each clinical domain.

Registry data collections and application are maintained and administered by the Statewide Cardiac Clinical Informatics Unit (SCCIU), which forms the business unit of QCOR. The SCCIU performs data quality, audit and analysis functions, and coordinates individual QCOR committees, whilst also providing expert technical and informatics resources and subject matter expertise to support continuous improvement and development of specialist Registry application modules and reporting.

The SCCIU team consists of:

Mr Graham Browne, Database Administrator	Mr William Vollbon, Manager*
Mr Marcus Prior, Informatics Analyst	Mr Michael Mallouhi, Clinical Analyst
Dr Ian Smith, PhD, Biostatistician	Mr Karl Wortmann, Application Developer

* Principal contact officer/QCOR program lead

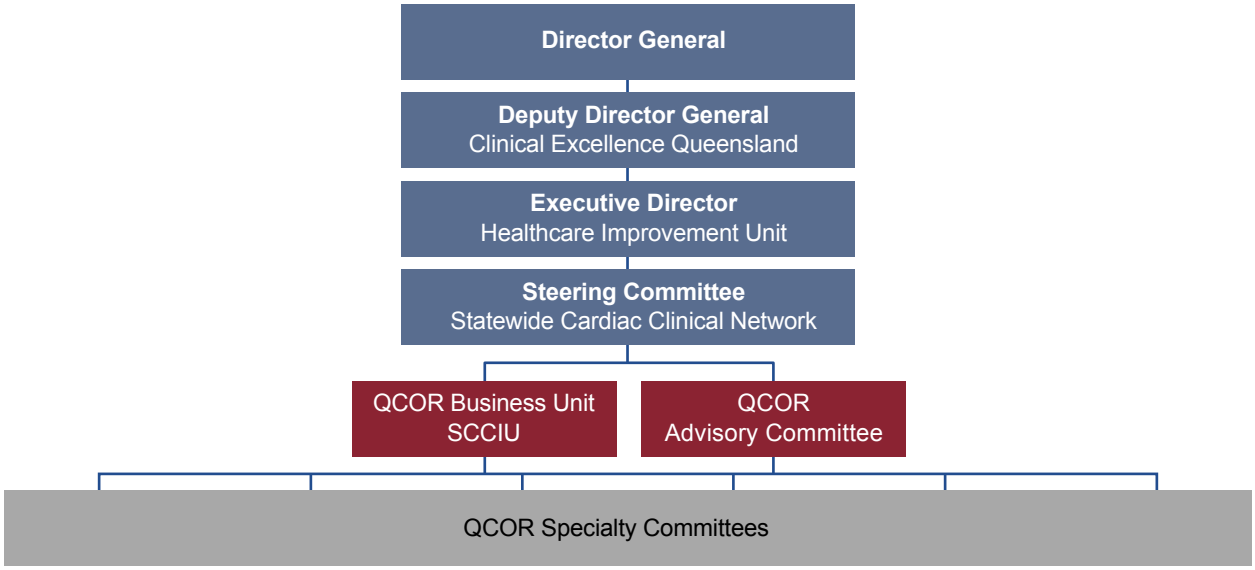
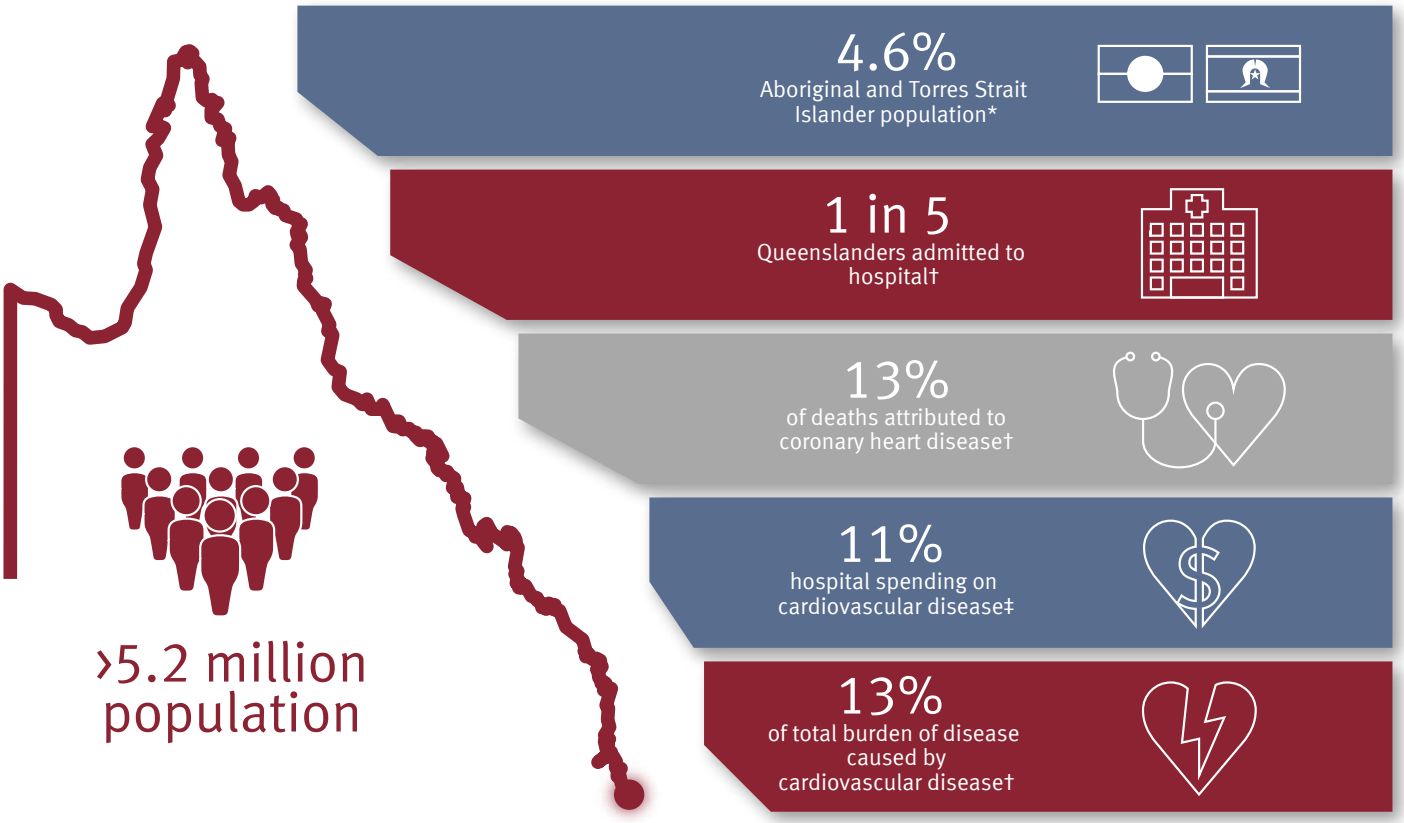


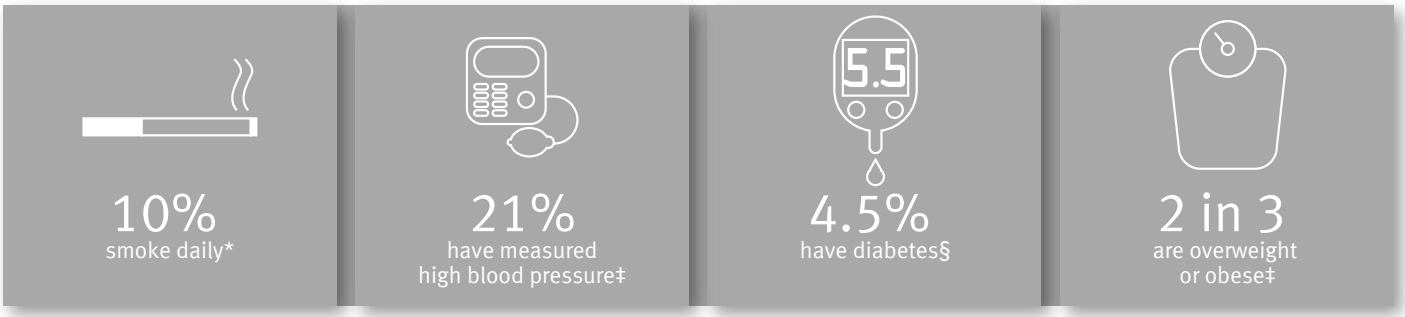
Figure 1: Governance structure

Queensland Cardiac Outcomes Registry

The Health of Queenslanders



Comorbidities



Mortality

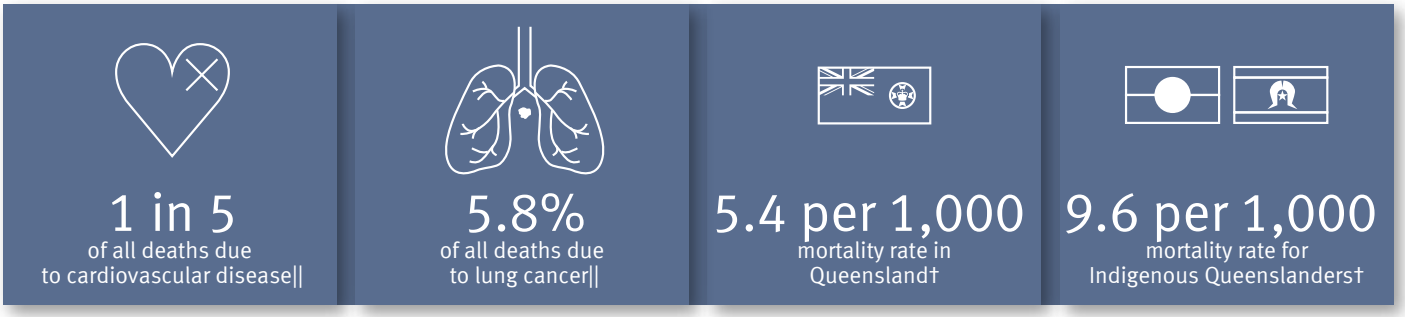


Figure 2: QCOR 2020 infographic

* Australian Bureau of Statistics. (2018). *Estimates of Aboriginal and Torres Strait Islander Australians*, June 2016. Cat. no 3238.055001. ABS: Canberra

† Queensland Health. (2020). The health of Queenslanders 2020. *Report of the Chief Health Officer Queensland*. Queensland Government: Brisbane

‡ Australian Bureau of Statistics. (2019). *National health survey: first results, 2017-18*. Cat. no. 4364.0.55.001. ABS: Canberra.

§ Diabetes Australia. (2018). *State statistical snapshot: Queensland*. As at 30 June 2018

|| Australian Institute of Health and Welfare (2021). MORT (Mortality Over Regions and Time) books: State and territory, 2015–2019. https://www.aihw.gov.au/getmedia/8967a11e-905f-45c6-848b-6a7dd4ba89cb/MORT_STE_2015_2019.xlsx.aspx

2020 Activity at a Glance

What's New?

- Paediatric cardiac surgery spotlight
- COVID-19 impact analysis
- STEMI <6 hours in and out of hours audit
- Expanded cardiac outreach reporting
- Expanded pre-hospital notification for PCI analysis
- Cardiac rehabilitation declined referral analysis

Interventional Cardiology

4,966
percutaneous coronary interventions

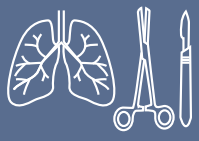
468
structural heart disease interventions

249
transcatheter aortic valve replacements

15,491
total coronary procedures

Cardiothoracic Surgery

2,651
adult cardiac surgeries



1,093
adult thoracic surgeries

Electrophysiology & Pacing

5,201
electrophysiology and pacing procedures

3,551
cardiac implantable electronic device procedures

Heart Failure Support Services

5,664
heart failure support services referrals

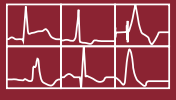
Cardiac Rehabilitation

11,177
cardiac rehabilitation referrals

Rheumatic Heart Disease

483
unknown rheumatic heart disease patients identified

Clinical Indicator Progress



81 mins
median first diagnostic ECG to reperfusion time for primary PCI

0.2%
procedural tamponade rate for cardiac device and electrophysiology procedures

92%
of patients referred to a heart failure support service on an ACEI, ARB or ARNI at discharge

93%
of cardiac rehabilitation referrals within 3 days of discharge

1.4%
mortality rate for coronary artery bypass surgery at 30 days

QCOR Yearly Trends

Interventional Cardiology

15,491
coronary cases in 2020
– up from 15,293 in 2018

4,966
PCI cases in 2020
– up from 4,867 in 2018

5 minute
improvement in median time to reperfusion for STEMI PCI
– 2017 to 2020

11%
increase in primary PCI cases meeting 90 minute target for timely reperfusion
– 2017 to 2020

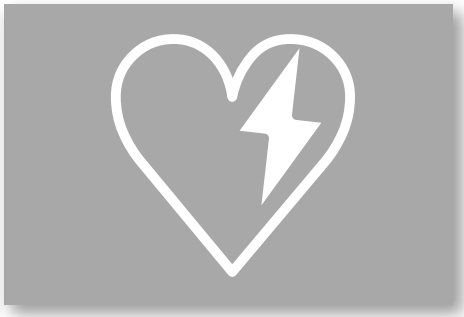
Cardiothoracic Surgery

12%
increase in cardiac surgery cases
– 2017 to 2020

29%
increase in thoracic surgery cases
– 2017 to 2020

Electrophysiology & Pacing

16%
increase in cases
– up from 4,474 in 2018



67%
increase in complex EP cases
– 2018 to 2020

Outpatient Support Services

›34,000
cardiac rehabilitation referrals
– 2018 to 2020

25%
increase in HFSS referrals
– 2017 to 2020

4 Acknowledgements

This collaborative report was produced by the SCCIU, audit lead for QCOR for and on behalf of the Statewide Cardiac Clinical Network. This would not be possible without the tireless work of clinicians in contributing quality data and providing quality patient care, while the contributions of QCOR committee members and others who had provided writing or other assistance with this year's Annual Report is also gratefully acknowledged.

QCOR Interventional Cardiology Committee

- Dr Sugeet Baveja, Townsville University Hospital
- Dr Niranjan Gaikwad, The Prince Charles Hospital
- Dr Paul Garrahy, Princess Alexandra Hospital
- Dr Christopher Hammett, Royal Brisbane & Women's Hospital
- Dr Rohan Poulter, Sunshine Coast University Hospital
- A/Prof Atifur Rahman, Gold Coast University Hospital
- Dr Shantisagar Vaidya, Mackay Base Hospital
- Dr Gregory Starmer, Cairns Hospital (Chair)

QCOR Cardiothoracic Surgery Committee

- Dr Anil Prabhu, The Prince Charles Hospital
- Dr Pallav Shah, Townsville University Hospital
- Dr Andrie Stroebel, Gold Coast University Hospital
- Dr Morgan Windsor, Metro North Hospital and Health Service
- Dr Christopher Cole, Princess Alexandra Hospital (Chair)

QCOR Cardiac Rehabilitation Committee

- Ms Michelle Aust, Sunshine Coast University Hospital
- Ms Maura Barnden, Metro North Hospital and Health Service
- Ms Jacqueline Cairns, Cairns Hospital
- Ms Yvonne Martin, Chronic Disease Brisbane South
- Dr Johanne Neill, Ipswich Hospital
- Ms Samara Phillips, Statewide Cardiac Rehabilitation Coordinator
- Ms Madonna Prenzler, West Moreton Hospital and Health Service
- Ms Deborah Snow, Gold Coast Hospital and Health Service
- Ms Natalie Thomas, South West Hospital and Health Service
- Mr Gary Bennett, Health Contact Centre (Chair)

Statewide Cardiac Clinical Informatics Unit

- Mr Michael Mallouhi
- Mr Marcus Prior
- Dr Ian Smith, PhD
- Mr William Vollbon

QCOR Electrophysiology and Pacing Committee

- Mr John Betts, The Prince Charles Hospital
- Mr Anthony Brown, Sunshine Coast University Hospital
- Mr Andrew Claughton, Princess Alexandra Hospital
- Dr Naresh Dayananda, Sunshine Coast University Hospital
- Dr Russell Denman, The Prince Charles Hospital
- Mr Braden Dinham, Gold Coast University Hospital
- Ms Sanja Doneva, Princess Alexandra Hospital
- Mr Nathan Engstrom, Townsville University Hospital
- A/Prof John Hill, Princess Alexandra Hospital
- Dr Bobby John, Townsville University Hospital
- Dr Paul Martin, Royal Brisbane & Women's Hospital
- Ms Sonya Naumann, Royal Brisbane & Women's Hospital
- Dr Kevin Ng, Cairns Hospital
- Dr Robert Park, Gold Coast University Hospital

QCOR Heart Failure Support Services Committee

- Mr Ben Shea, Ipswich Hospital
- Ms Angie Sutcliffe, Cairns Hospital
- Ms Tina Ha, Princess Alexandra Hospital
- Ms Helen Hannan, Rockhampton Hospital
- Ms Annabel Hickey, Statewide Heart Failure Services Coordinator
- Dr Rita Hwang, PhD, Princess Alexandra Hospital
- Dr Kevin Ng, Cairns Hospital
- Ms Robyn Peters, Princess Alexandra Hospital
- Ms Serena Rofail, Royal Brisbane & Women's Hospital
- Dr Yee Weng Wong, The Prince Charles Hospital
- A/Prof John Atherton, Royal Brisbane & Women's Hospital (Chair)

Queensland Ambulance Service

- Dr Tan Doan, PhD
- Mr Brett Rogers

5 Executive summary

This report comprises an account for cases performed in the eight cardiac catheterisation laboratories (CCL), nine electrophysiology and pacing (EP) facilities, along with five cardiothoracic surgery units operating across Queensland public hospitals in 2020. All referrals to heart failure support (HFSS) and cardiac rehabilitation (CR) services have also been included in this Annual Report.

- 15,491 diagnostic or interventional cases were performed across the eight public CCL facilities in Queensland hospitals. Percutaneous coronary intervention (PCI) was performed in 4,966 of these cases.
- Patient outcomes following PCI remain encouraging. The 30 day mortality rate following PCI was 1.5%, and of the 75 deaths observed, over two thirds (69%) were classed as either salvage or emergency PCI.
- When analysing the ST segment elevation myocardial infarction (STEMI) patient cohort, the median time from first diagnostic electrocardiograph (ECG) to reperfusion was 81 minutes, while the median time from arrival at PCI facility to reperfusion was measured at 40 minutes.
- For STEMI presenting within six hours of symptom onset the median time from arrival to PCI facility to reperfusion was 32 minutes for cases performed in working hours (8am to 6pm, Monday to Friday), while cases occurring out of hours had a median time of 44 minutes.
- STEMI cases presenting within six hours of symptom onset with no pre-hospital notification had a longer median time from arrival PCI facility to reperfusion compared to cases where the cardiologist was notified pre-hospital (81 minutes vs. 32 minutes).
- There were 468 structural heart interventions performed across participating CCL facilities, including 313 transcatheter valve procedures, and 249 transcatheter aortic valve replacement procedures. The all-cause 30 day mortality rate for all SHD interventions was 1.1%, ranging from 0.0% to 1.8% across participating centres.
- Across the four sites with a cardiac surgery unit, a total of 2,651 cases were performed including 1,581 cases involving coronary artery bypass grafting and 1,142 valve procedures.
- The observed rates for cardiac surgery mortality and morbidity are either within the expected range or better than expected depending on the risk model used to evaluate these outcomes. This is consistent with the results of previous Audits.
- Across the period of 2016 to 2020, 1,372 children underwent cardiac surgery, including 279 children in 2020.
- There were 1,505 paediatric cardiac surgical procedures performed across 2016–2020, either with or without cardiopulmonary bypass (1,147 and 358 procedures respectively).
- Thirty day mortality after paediatric cardiac surgery was observed at 0.9% between 2016–2020.
- A total of 1,093 thoracic surgery (TS) cases were performed across the five public hospitals providing thoracic surgery services in 2020. Almost a quarter (24%) of surgeries followed a surgical indication of primary lung cancer, whereas pleural disease accounted for nearly a third of all cases (29%).
- The unadjusted all-cause 30 day mortality rate following TS was 0.7%, increasing to 1.9% at 90 days post surgery.
- At the nine public EP sites, a total of 5,201 cases were performed, which included 3,551 cardiac device procedures and 1,286 cardiac electrophysiology procedures.
- The EP clinical indicator audit identified a median wait time of 104 days for complex ablation procedures, and 36 days for elective implantable cardioverter defibrillator (ICD) implants. Meanwhile the median wait time for a standard ablation procedure was 99 days.
- There was a total of 11,177 referrals to public CR services in 2020. Three quarters of referrals followed an admission at a public hospital in Queensland.
- Nearly two thirds (64%) of CR referrals proceeded to pre assessment by a CR service. The most common reason this did not take place was that the patient declined or was not interested.
- The vast majority (93%) of referrals to CR were created within three days of the patient being discharged from hospital, while over half of patients went on to complete an initial assessment by CR within 28 days of discharge (58%). This result is consistent with performance data for 2019.
- There were 5,664 new referrals to a HFSS in 2020, a seven percent increase over the previous year.
- Upon discharge from hospital, the prescription of an ACEI, ARB or ARNI, beta blocker, and MRA for heart failure with reduced ejection fraction (HFrEF) patients was measured at 92%, 92% and 46% respectively.
- At the time of beta blocker titration review, 77% of HFrEF patients had achieved the guideline target or maximum tolerated beta blocker dosage.

6 Spotlight: Cardiac Outreach

The first stages of the Networked Cardiac Services (NCS) program has enabled significant and tangible system reform as well as improved healthcare for patients. From 2019 to present, cardiology services and their partners across the state have begun to adopt this integrated model of care, underpinned by strong regional capability and accountability.

In 2017/18, the Statewide Cardiac Clinical Network commissioned an investigative Report on the state of cardiac care and outreach services provided by Queensland Health. This led to the development of the Implementation Framework for Networked Cardiac Care and Outreach Services in Queensland (2018), written in partnership with the Aboriginal and Torres Strait Islander Division (then, Branch). In 2019, the Ministerial Rapid Results Program nominated to support, progressively fund, and implement the Framework (Networked Cardiac Services) across the state (Figure 1).

The initial investigative Report identified several key opportunities for improvement:

- Significant variations in health care and outcomes across Queensland. People living in rural and remote locations and Aboriginal and Torres Strait Islander people are admitted to hospital for cardiac-related conditions two to three times more than the broader population.
- Inequitable access to health care due to Queensland's vast geographical size and dispersed population.
- Lack of integration and continuity between and within health care sectors.
- Poor access to and/or use of technology.
- Limited or no data about or evaluation of existing services.
- Unreliable funding and disparate resource allocation.
- Historical models of care persist, whereby patients and clinicians travel past the closest health care facility, creating inefficiency, inequitable resource allocation, untapped potential, uncoordinated and potentially unsafe care.
- Successful, existing improvement initiatives in the field are not leveraged or spread to other jurisdictions.

In response, an implementation framework recommended the following improvements:

Improve access, equity, quality & safety, and efficiency

- **Care close to home, delivered by consistent, regional teams**

  It was identified that the eight cardiac tertiary hospital services spread along the east coast of Queensland and their adjacent healthcare services should be enabled and accountable for providing quality, cardiac care for their own communities – 'networked' or 'hub' and 'spoke' model of care.

  Restructure cardiac services to reflect natural patient flow and harness full potential of services i.e., eight cardiac specialist 'hubs' and adjacent 'spokes'.

  Build capability and capacity of regional teams to provide care for their own communities.

- **Coordination and integration**

  High-value, patient care-coordination model and shared care across health sectors (public and private, primary health, and Aboriginal and Torres Strait Islander health services).

- **Evidence, evaluation, and improvement**

  Evidence-based care informed by data.

- **Technology**

  Regional teams provided with and enabled to use technology to support healthcare.

- **Sustainable funding and resources**

  Funding model that resolves initial inequity and ongoing sustainability, including activity and value-based approaches.

- **Governance and accountability**

  Regions lead and are responsible for clinical and service outcomes via stakeholder engagement, formal governance arrangements and access to information.

- **Harness existing investments and programs**

  For exponential benefits and efficiency.

Since 2019, eight Hospital and Health Services (HHSs) have progressively implemented the roll-out of NCS. All remaining HHSs have participated in planning for and endorsed implementation of NCS, given financial support from the Queensland Department of Health (Table 1). Business Cases have been approved by the Rapid Results Cardiac Steering Committee. Funding for the remaining stages is yet to be identified.

Implementing quality improvements and sustainable change takes time and, therefore, full outcomes from the program are not anticipated to be seen until at least 12 months postimplementation.

Through 2018–2019, the SCCIU and Rapid Results Program collaborated with staff and subject matter experts across the various Queensland Health cardiac outreach units to develop a new QCOR module specifically oriented towards this work. The new QCOR Outreach Module establishes a foundation for cardiac outreach care coordination across the health system, and a reporting platform which allows an unprecedented amount of information to be available for an area otherwise characterised by relative paucity of data.

The QCOR Outreach Module provides Queensland Health practitioners with:

- Patient-centric clinical case management – tailored towards the outreach setting,
- Improved follow up and activity-based reporting for outreach patients and services,
- Reporting of outreach-specialty clinical indicators and other key performance measures, and
- Potential for future integration with other Queensland Health and QCOR systems.

The new QCOR Outreach Module was deployed from 2019 as part of a staggered rollout, with the Far North Queensland Outreach Unit as the first site commencing in November 2019. Further units have been added to the system over the following year as either new outreach programs are established or existing services transition to the system.

Table 1: QCOR cardiac outreach module – participating outreach units

Cardiac outreach unit	Hub facility	Commenced date
Far North Queensland Cardiac Outreach	Cairns Hospital	November 2019
Townsville and North West Queensland Cardiac Outreach	Townsville University Hospital	January 2020
Princess Alexandra Hospital Cardiac Outreach	Princess Alexandra Hospital	July 2020
Toowoomba Hospital Cardiac Outreach	Toowoomba Hospital	August 2020
Ipswich Hospital Cardiac Outreach	Ipswich Hospital	November 2020

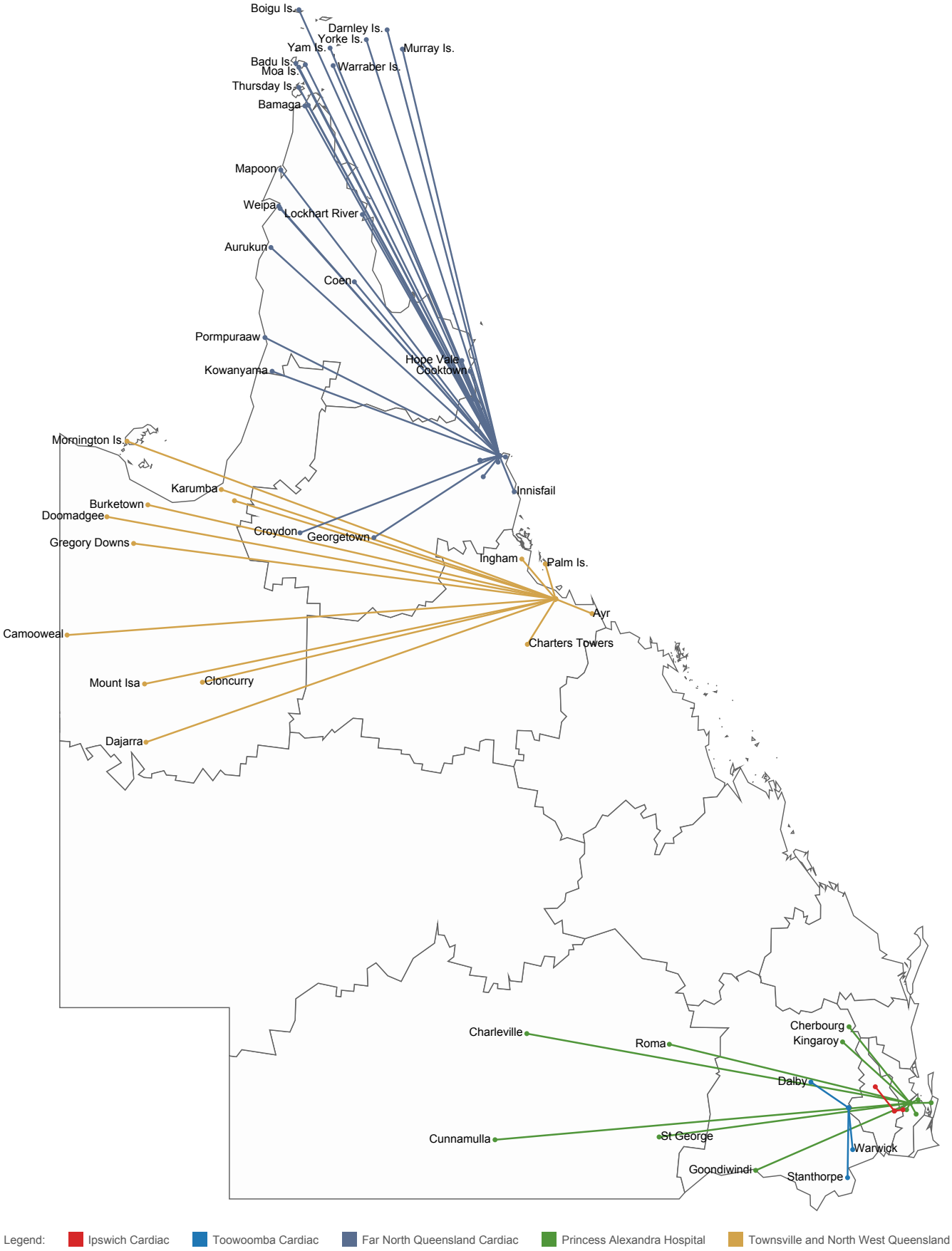


Figure 1: Cardiac outreach hub and spoke locations

Cardiac outreach units each have a responsibility to provide services to a differing number of spoke sites. Each spoke site has its own requirements and workflow which requires units to be agile and able to adapt to many different clinic environments. Spoke sites numbers may change over time with new services being identified based on need and the capacity for the hub units to provide services.

Table 2: Networked cardiac outreach – total spoke sites by outreach unit

Cardiac outreach unit	All spokes n
Far North Queensland Cardiac Outreach	33
Townsville and North West Queensland Cardiac Outreach	14
Princess Alexandra Hospital Cardiac Outreach	13
Toowoomba Hospital Cardiac Outreach	3
Ipswich Hospital Cardiac Outreach	2
Total	**65**

Over the course of 2020, there were 266 clinics operated through the NCS model. Not all units were operating at full capacity for the entire duration of the year which is reflected in Table 3 below. Some units took on clinic sites that were previously operated by other services whilst some units continued their previous work which were services offered for many years but transitioned to the NCS model.

Table 3: Networked cardiac outreach – participating outreach unit total clinics

Cardiac outreach unit	All clinics* n
Far North Queensland Cardiac Outreach	96
Townsville and North West Queensland Cardiac Outreach	84
Princess Alexandra Hospital Cardiac Outreach	67
Toowoomba Hospital Cardiac Outreach	9
Ipswich Hospital Cardiac Outreach	10
Total	**266**

* Note varying start dates of some services

There have been 3,396 total consults delivered as part of the NCS program. Larger and more established hub sites comprise of the greatest numbers which is also reflective of the higher number of clinics performed and number of spoke sites the unit is responsible for.

Table 4: Networked cardiac outreach total consults performed and total distinct patients per hub site

Cardiac outreach unit	All consults n	All patients n
Far North Queensland Cardiac Outreach	1,341	1,112
Townsville and North West Queensland Cardiac Outreach	901	775
Princess Alexandra Hospital Cardiac Outreach	1,053	899
Toowoomba Hospital Cardiac Outreach	69	62
Ipswich Hospital Cardiac Outreach	32	31
Total	**3,396**	**2,879**

There were 2,879 patients enrolled in the NCS outreach service since its inception. Of these patients 1,601 (59%) were male. The largest subgroup of this cohort were males aged between 60 years and 69 years and males aged between 70 years and 79 years. The largest proportion of females was in the cohort aged between 60 years and 69 years of age.

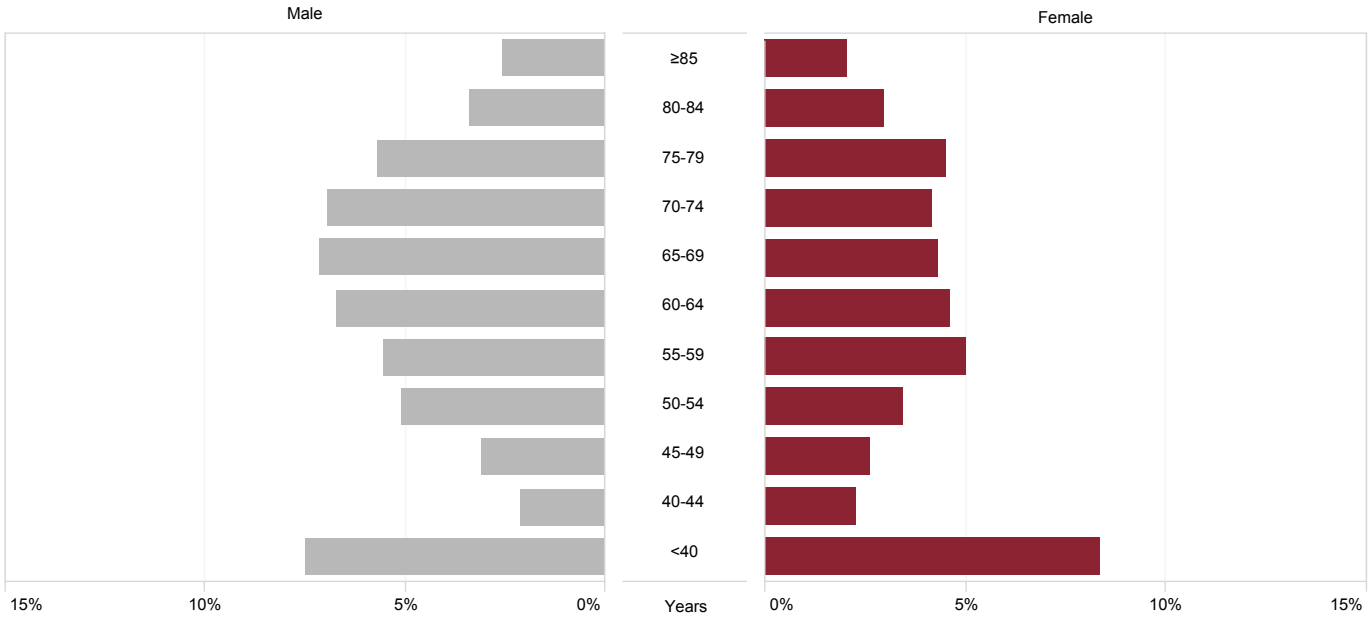


Figure 2: Proportion of outreach consults by age and gender

Table 5: Networked cardiac outreach number of patients by age group and gender at all sites

Gender	Age group	All patients n (%)
Male	<40	227 (7.9)
	40–49	154 (5.3)
	50–59	305 (10.6)
	60–69	393 (13.7)
	70–79	355 (12.3)
	80–89	156 (5.4)
	≥90	14 (0.5)
Female	<40	249 (8.6)
	40–49	149 (5.2)
	50–59	248 (8.6)
	60–69	257 (8.9)
	70–79	236 (8.2)
	80–89	130 (4.5)
	≥90	13 (0.5)
Total		**2,879 (100.0)**

Of the overall cohort enrolled in NCS outreach programs, 2,879 distinct patients were seen by teams. Aboriginal and Torres Strait Islander patients accounted for 39% of the group. This is considerably higher than the resident proportion of Aboriginal and Torres Strait Islander population of Queensland of 4.6%.

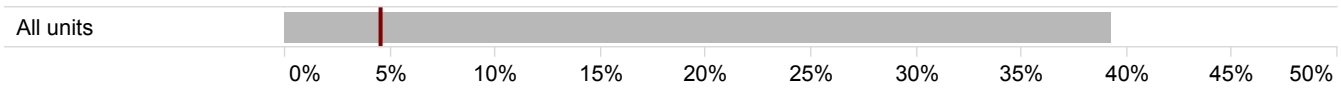


Figure 3: Proportion of Aboriginal and Torres Strait Islander patients seen in cardiac outreach

Patients who reside in the Torres and Cape HHS account for the largest proportion (20%) of patients seen. This is followed closely by the Cairns and Hinterland HHS (19%) and Darling Downs HHS (15%). A small proportion of patients resided interstate at the time of their encounter (1.3%). It should be noted that some patients may temporarily reside in one HHS but their permanent address is elsewhere but for the purpose of this analysis, permanent address is presented.

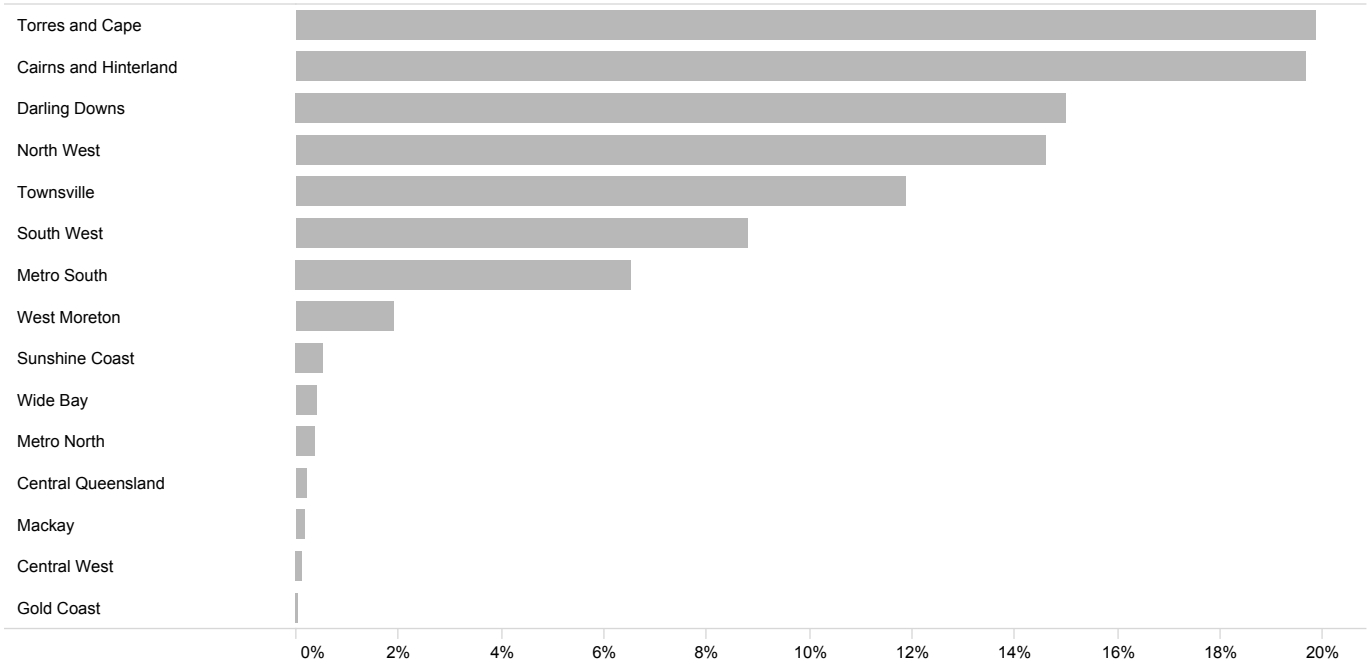


Figure 4: Proportion of patients by HHS of residence since commencement

Of the 3,396 total consults delivered as part of the NCS program, just under half of these consults were new encounters (45%), which represents a large volume of clinical work and focus to establish patient rapport, assess often complex medical history, and formulate a plan of treatment and management. It would be anticipated that over time, the proportion of new to review patients will shift, reflective of the fact that cardiac conditions are mostly a chronic disease.

Table 6: Number and proportion of new and review cardiac outreach consults

Consult type	n (%)
New	1,527 (45.0)
Review	1,869 (55.0)
ALL	**3,396 (100.0)**

Integrated outreach services are flexible and look to add value where opportunity presents. Opportunistic specialist review of inpatients while treating teams are in regional facilities allows for expert clinical treatment and efficient facilitation of treatment and escalation for transfer where appropriate (in person, non-clinic). NCS teams are also instrumental in the organisation and provision of telehealth consultations which are performed both in clinic and in other non-clinic locations such as GP practices and other healthcare facilities (telehealth, non-clinic). Due to the COVID-19 pandemic, larger than anticipated numbers of telehealth consultations were performed (29%).

Table 7: Number and proportion of in person and telehealth consults by clinic mode

Delivery mode	Clinic n (%)	Non-clinic n (%)	All n (%)
In person	2,350 (97.2)	67 (2.8)	2,417 (71.2)
Telehealth	551 (56.3)	428 (43.7)	979 (28.8)
Total	**2,901 (85.4)**	**495 (14.6)**	**3,396 (100.0)**

The majority of patients seen in outreach resided less than 50 kilometres from their consult location (80%), demonstrating that outreach services are meeting their objective to provide care closer to home. A smaller proportion of patients (8%) still needed to travel more than 150 kilometres to access specialist care, which highlights the barriers to care and travel distances faced by Queenslanders living in regional and remote locations.

Table 8: Number and proportions of patients by driving distance to consult

Driving distance – home to consult	n (%)
≤50 km	2,707 (79.7)
50 km–100 km	322 (9.5)
100 km–150 km	57 (1.7)
›150 km	276 (8.1)
Incomplete data	34 (1.0)
ALL	**3,396 (100.0)**

Outreach services offered large travel distance savings as a result of patients attending clinics at spoke sites instead of travelling to the hub site. These values are determined by calculating the difference in driving distance between the patient's place of residence to the hub site and the patient's place of residence to the spoke site. The largest travel distance savings were observed in the cohort residing furthest from the outreach unit hub.

Table 9: Median distance of patient address to hub sites

Distance category	Median distance km
›50 km–100 km	80
100 km–150 km	112
›150 km	474

The ability to perform cardiac investigations on site at the time the patient is in attendance at the outreach clinic further demonstrates savings in travel, increases treatment efficiency due to immediate availability of information and decreases complexity of investigations for patients who often have significant barriers to care. The most frequently performed investigation during outreach was 12 lead electrocardiography (ECG) followed by transthoracic echocardiography.

Table 10: Number of investigations performed in outreach clinics

Investigation	n
12 lead ECG	1,662
Transthoracic echocardiography	995
Cardiac implantable electronic device interrogation	29
Exercise stress test	19
24 hour Holter ECG monitor	3
Other	34
ALL	**2,742**

7 Spotlight: ECG Flash

ECG Flash is a Statewide Cardiac Clinical Network initiative that allows rural and remote clinicians 24/7 access to urgent specialist cardiology advice. When a patient presents at emergency or within a healthcare facility and an ECG is taken, the system lets clinicians send time-critical and difficult to interpret ECGs straight to an on call cardiologist for rapid analysis. The on call cardiologist receives a digital copy of the ECG to review and will call the treating clinician back to provide treatment advice. ECG Flash has been implemented to use as a hub and spoke model of care where larger facilities with specialist staff cardiologists act as the hub to smaller regional and remote centres (spoke sites).

Spoke sites use a digitally enabled ECG cart that automatically transmits all ECGs taken to an enterprise clinical data storage application. This digital storage solution for ECGs is available at each site and from there, clinicians can selectively transmit time-critical, difficult to interpret, urgent or technically challenging ECGs directly to the on call cardiologist at their referring tertiary hospital (hub site). They are also able to access ECGs taken at other participating hospitals within their HHS, allowing them to have access to patients' ECGs across multiple facilities.

In 2020, 55 rural sites were utilising the ECG Flash solution, with 229 time-sensitive ECGs escalated through to six receiving cardiology departments for clinical interpretation. These were often in the context of patients presenting in a critically unwell state. Further use of ECG Flash data to complement existing QCOR data collections will be a focus for future work.

Table 1: ECG Flash – participating tertiary sites

ECG Flash hub sites	Commenced date	Number of spoke sites
Thursday Island	January 2020	10
Cairns Hospital	September 2018	13
Townsville University Hospital	June 2019	7
Mackay Base Hospital	February 2019	7
Bundaberg Hospital	August 2019	8
Princess Alexandra Hospital	August 2018	10

Figure 1: ECG Flash hub and spoke locations as at November 2020

8 Spotlight: Rheumatic Heart Disease Program

8.1 Background

The Queensland Rheumatic heart disease register and control program (RHD Program) was established in 2009 to address rheumatic heart disease (RHD) as the leading cause of cardiovascular disparity between Aboriginal and Torres Strait Islander peoples and Australians of other descent. The program supports existing healthcare services by maintaining a skilled health workforce, promoting culturally appropriate care, supporting education and health promotion for patients and communities, and working with patients and primary health care staff to optimise delivery of secondary prophylaxis.

The program further delivers, advocates for, and supports primordial, primary and secondary prevention activities aimed at preventing, identifying, managing and treating acute rheumatic fever (ARF) and RHD.

The World Health Organization recommends a coordinated, public health approach in areas where there are substantial populations with ARF or RHD. The Australian Guideline for prevention, diagnosis and management of ARF and RHD* states that 'Comprehensive RHD control programs which span action in the social and environmental determinants of health and primary and secondary prevention of ARF, can provide an effective approach to reducing the burden of RHD.' It is with this structure and suggested methodology that the Queensland RHD Program has been established.

8.2 The disease

ARF is an acute illness causing a generalised, autoimmune inflammatory response following repeated exposure to and infection with Group A Streptococcal bacteria. The inflammatory response occurs predominantly in the heart, joints, brain and skin. Presentations are often subtle, clients typically present with a history of a sore throat and/or infected skin sores, pain and swelling in one or more joints, fever and chest pain. Chorea (jerky, uncoordinated movements of the hands, feet, tongue and face), skin and subcutaneous manifestations are uncommon but do appear to vary in frequency across populations, gender and age.* Clinical investigations may identify prolonged atrioventricular junctional arrhythmias on an electrocardiogram, a heart murmur or carditis.

Once the initial acute illness has resolved, ARF leaves no lasting damage to the joints or skin however, sustained inflammation of the brain in clients with Sydenham's chorea can cause permanent damage and lead to the development of mental health and neurological sequalae. Similarly, the autoimmune response that inflames the heart can lead to permanent damage to the heart valves known as rheumatic heart disease (RHD). Repeated episodes of ARF inevitably lead to the development or worsening of RHD.

Severe RHD usually requires surgical intervention in the form of valve repair and/or replacement. Individuals receiving mechanical valves require lifelong anticoagulation. Every year, RHD kills people and devastates lives, particularly those of young Aboriginal and Torres Strait Islander Queenslanders. The disease process begins with symptoms as simple as a sore throat or skin infection which can be easily treated with common antibiotics, however if left untreated, it can lead to valve disease requiring cardiac surgery, stroke and sometimes death. Efforts to prevent ARF and RHD currently centre on primary prevention (of the sore throat or skin infection), and secondary prevention via delivery of secondary prophylactic antibiotics to prevent recurrent episodes.

* RHD Australia (ARF/RHD writing group) (2020). *The 2020 Australian guideline for prevention, diagnosis and management of acute rheumatic fever and rheumatic heart disease* (3rd edition). Retrieved from https://www.rhdaustralia.org.au/arf-rhd-guideline

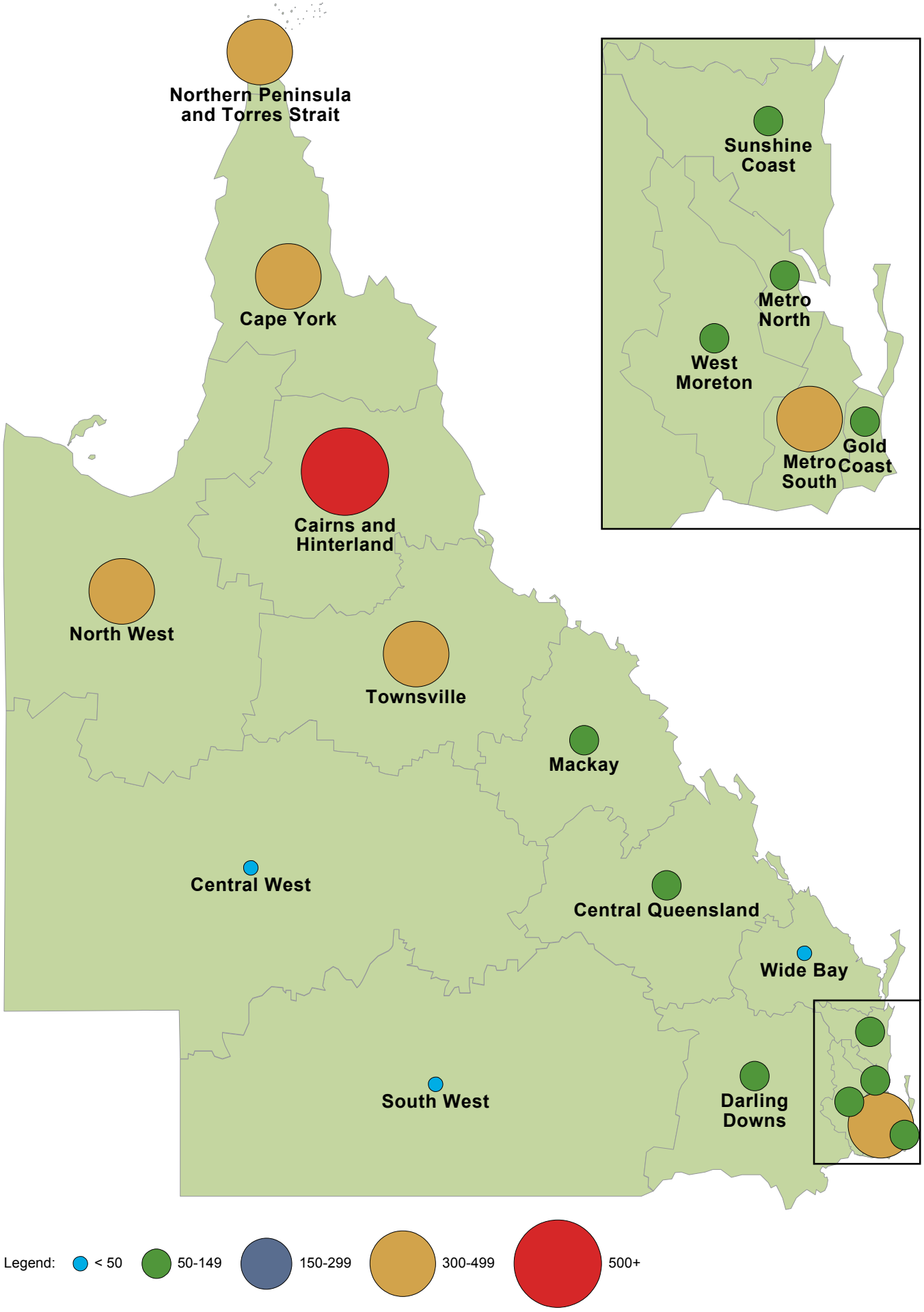


Figure 1: Rheumatic Heart Disease active clients by area of residence

8.3 Disease demographics

Across Australia, sustained improvements to the conditions in which we are born, grow, live and work have permanently reduced the rates of preventable infectious diseases. Unfortunately, this progress is inequitable and Aboriginal and Torres Strait Islander people have not benefitted from the same improvements in health and living outcomes as the rest of Australia. Household disadvantage, poor-quality living conditions, poverty and overcrowding all contribute to health inequalities in at-risk populations.

ARF and RHD are diseases that exemplify the 'gap' between Aboriginal and Torres Strait Islander peoples and Australians of other descent. In Queensland, 2019 the rate of ARF cases was 41.6 per 100,000 Aboriginal and Torres Strait Islander Australians whereas for all Queenslanders the rate was 2.2 per 100,000.† The prevalence of RHD was 627.4 cases per 100,000 Aboriginal and Torres Strait Islander Australians whereas for Australians of other descent the rate was 15.9 per 100,000.†

8.4 The costs of ARF and RHD

Eliminating RHD means preventing all new cases of ARF. Preventing ARF is as simple as early diagnosis and treatment of a Streptococcal infection. This cost is negligible in comparison to the long-term management of what would become chronic disease.

8.4.1 Human cost of RHD

ARF and RHD contribute to increased death and disability in Queensland. RHD accrues early in life, with 17% of people on the Queensland RHD Register under 18 years of age and 23% of all ARF and RHD clients having had or will require valvular surgery.

8.4.2 Financial cost of ARF and RHD

The estimated costs of ARF and RHD diagnosis and management are outlined in Table 1.‡

Table 1: Costs of diagnosis and management of ARF and RHD

	Child $	Adult $
Management of acute disease requiring hospitalisation		
ARF – Inpatient	12,075	12,912
RHD – Non-Surgical	11,798	9,787
RHD – Surgical	74,915	72,042
ARF/RHD Management (per year)		
ARF with/without mild RHD	2,048	2,048
Severe RHD	3,920	3,920

† Australian Institute of Health and Welfare (2020). *Acute rheumatic fever and rheumatic heart disease in Australia, 2015–2019*. Retrieved from https://www.aihw.gov.au/reports/heart-stroke-vascular-diseases/acute-rheumatic-fever-and-rheumatic-heart-disease/data

‡ Wyber, R., Noonan, K., Halkon, C., Enkel, S., Ralph, A., … Carapetis, J. (2020.). *The RHD Endgame Strategy: A Snapshot. The blueprint to eliminate rheumatic heart disease in Australia by 2031*. Perth: The END RHD Centre of Research Excellence, Telethon Kids Institute

8.5 Disease prevention

Interventions to eradicate ARF and RHD in Australia require strategies that target the underlying economic, social and environmental conditions. These are structural and health system considerations that include moving away from a silo-based culture and transitioning towards functional multiagency, multidisciplinary teams. By actioning disparities in the environmental, social, cultural and economic determinants of health, primary and secondary prevention strategies for ARF and RHD can be developed. These then lend themselves to effective tertiary care which provides clients with high-quality medical and surgical management of their RHD.

8.6 Queensland RHD Program and Queensland Cardiac Outcomes Registry

In September 2018, RHD became a notifiable condition in Queensland. Since April 2019, QCOR and the RHD program have collaborated to enhance the reporting of all RHD-identified echocardiograms to the RHD register for Cairns, Townsville, Mackay and Rockhampton hospitals. Interaction between the RHD Register and QCOR acts as a supporting notification mechanism, assisting to identify those patients who have not previously been or were escalated for notification of RHD at the time of their clinical encounter.

Between 2020–2021 QCOR, reporting of positive RHD findings by echocardiography has resulted in 147 previously unknown clients with RHD being added to the Register.

Table 2: QCOR echocardiography module RHD notifications

	Positive RHD findings n	Unknown RHD clients identified n
Cairns	503	55
Townsville	206	60
Mackay	45	18
Rockhampton	26	14
Total	**780**	**147**

During 2020–2021 QCOR cardiac surgery RHD notification reports, 336 previously unknown clients requiring surgery for their RHD have been added to the RHD register.

Table 3: QCOR cardiac surgery module RHD notifications

	Positive RHD findings n	Unknown RHD clients identified n
Townsville	182	33
Gold Coast	59	44
Princess Alexandra Hospital	48	40
The Prince Charles Hospital	325	217
Total	**614**	**336**

9 Spotlight: COVID-19 pandemic

9.1 Introduction

Health services in the state of Queensland have been significantly impacted by restrictions and limitations related to the COVID-19 pandemic. The first case of COVID-19 in Queensland was detected in late January 2020, after which a series of public health measures subsequently followed that significantly changed the way that healthcare was delivered.

Following the declaration of a global pandemic by the World Health Organisation on 11 March 2020, Australia entered the first stage of a nationwide shutdown on 23 March 2020, which limited activity, travel and social interaction.

In preparation for a surge in patients requiring hospital treatment for COVID-19 infection, the provision of cardiac services changed with reductions to the number of elective admissions and procedures as well as diagnostic studies and outpatient consultations. The slowdown in activity associated with COVID-19 had several effects, one of which was a reduction in trauma admissions due to less social activity and a resultant increase in hospital bed availability. The view was postulated that a delay in diagnosis of patients with cardiac disease would result in more urgent and emergent cases, but these impacts appear to have been minimal.

The use of personal protective equipment and protocols set up by hospital emergency departments, catheterisation laboratories, operating theatres and cardiac wards collectively impacted processes involved in patient care – resulting in increased difficulties in assessing patients and delays in commencing and administering treatment.

Outpatient support services such as cardiac rehabilitation and heart failure support services were also affected. Some community health facilities pivoted to provide COVID-19 testing support while some outpatient programs were temporarily closed due to the redeployment of staff to other areas of healthcare, or the reclaiming of gym spaces to deliver pop up COVID-19 screening clinics and vaccination hubs. Public health directives also placed restrictions on outpatient programs by limiting the number of people per square metre and mandating the use of face masks. Outpatient programs responded to these challenges while maintaining service provision, and many adapted their services to deliver these via alternative means such as telehealth.

With all these effects plus the likely negative influence on patient presentations to medical facilities and under-utilisation of hospital resources, this special section was added to this year's Report, aiming to characterise the effects the pandemic had on cardiac services in Queensland in 2020.

9.2 Procedure volumes

In the Queensland public health system, the utilisation of most cardiac services declined during April 2020 more than expected based on seasonal variation alone. Similar findings have been well documented both nationally and internationally across many medical and surgical specialties, with particular impacts noted on the rates of hospitalisation for acute coronary syndromes.*,†

Interventional cardiology

An overall reduction in cardiac catheterisation laboratory cases was observed in April 2020. This is owed mainly to a decreased volume of elective procedures. Case volumes returned to pre-pandemic volumes by June 2020 and tapered toward the end of the year as is usual for that time of year due to Christmas period service closures.

Total case volumes for all of 2020 only decreased by 0.7% for PCI procedures, which is reassuring considering April 2020 volumes declined considerably. Similarly, case numbers for other diagnostic coronary procedures were stable with only a 0.8% decrease compared to the previous year.

Cardiac surgery

In 2020, there were 2,651 cardiac surgery procedures which was a marginal increase (1.1%) on 2019. Soon after the announcement of the global COVID-19 pandemic, cardiac surgery case volumes exhibited a marked decrease in April 2020. Case numbers had increased by June, and later reached a peak in September.

There was a reduction in valve surgeries and other procedures during April 2020, whilst CABG numbers remained steady in comparison to previous months. Aortic procedures and other cardiac surgeries were also scaled back during this time.

Thoracic surgery

There was a 4.9% increase in thoracic surgery cases performed in 2020 compared to 2019 despite the challenges of the COVID-19 pandemic. However, it was evident that during the peak month of April 2020 case numbers fell considerably. There was a notable decrease in operations for all other indications except primary lung cancer.

The decrease in surgical volume in September 2020, could be attributable to the larger than average cardiac surgical volumes in the same period, given this surgical specialty shares resources and clinicians. Reduced case volumes in December are consistent with usual variation in service capacity for this time of year.

Electrophysiology and pacing

Electrophysiology and pacing services saw a 12% growth in cases from 2019 to 2020. A small portion of this growth can be attributed to extra case detail captured for Toowoomba Hospital (n=86). As exhibited across other service lines, there was a reduction in cases in April 2020 which saw most electrophysiology and ablation cases cease. The months following demonstrated an upward trend in case numbers, presumably related to cases which had been scheduled but not performed in April.

Table 1: Total cases for interventional cardiology, cardiac surgery, thoracic surgery and electrophysiology and pacing by year, 2019–2020

Service line	2019 n	2020 n
Interventional cardiology	5,002	4,966
Cardiac surgery	2,622	2,651
Thoracic surgery	1,042	1,093
Electrophysiology and pacing	4,654	5,201

* Solomon, M.D., McNulty, E.J., Rana, J.S., Leong, T., Lee, C., Sung, S., … Go, A.S. (2020). The COVID-19 pandemic and the incidence of acute myocardial infarction. *N Engl J Med, 383*(1), 691-693. doi: 10.1056/NEJMc2015630.

† De Filippo, O., D'Ascenzo, F., Angelini, F., Bocchino, P.B., Conrotto, F., Saglietto, A., … De Ferrari, G. (2020). Reduced rate of hospital admissions for ACS during Covid-19 outbreak in northern Italy. *N Engl J Med, 383*(1), 88-89. doi: 10.1056/NEJMc2009166.

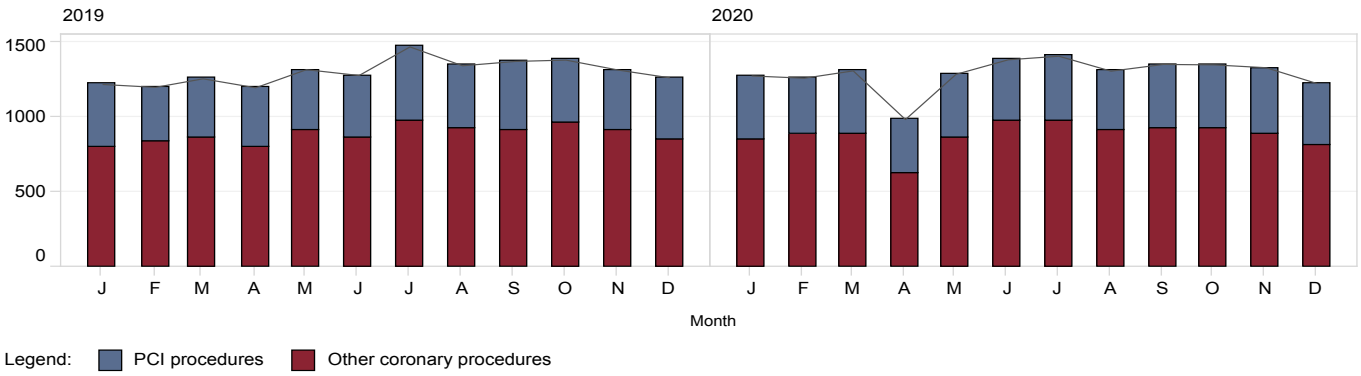


Figure 1: Proportion of all diagnostic and interventional cardiology cases by case category and month, 2019–2020

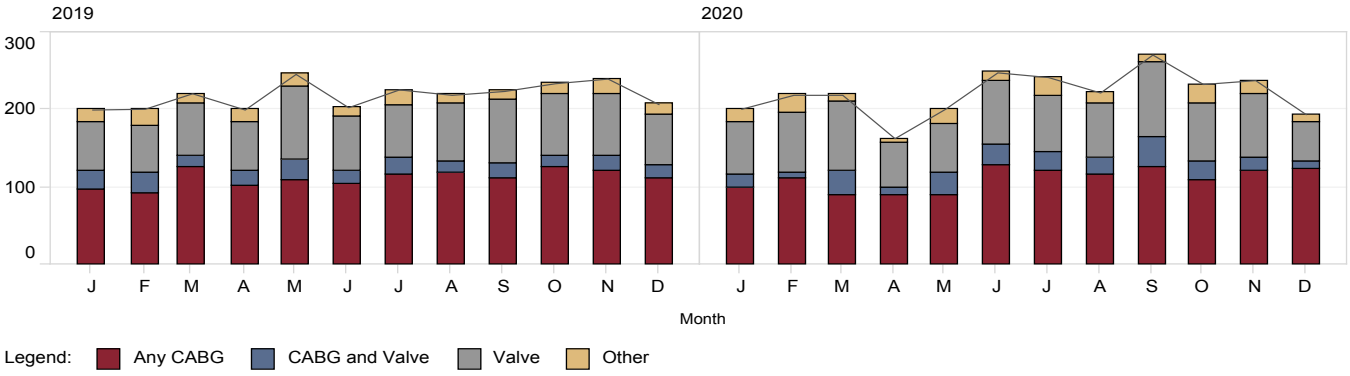


Figure 2: Proportion of all cardiac surgery cases by procedure category and month, 2019–2020

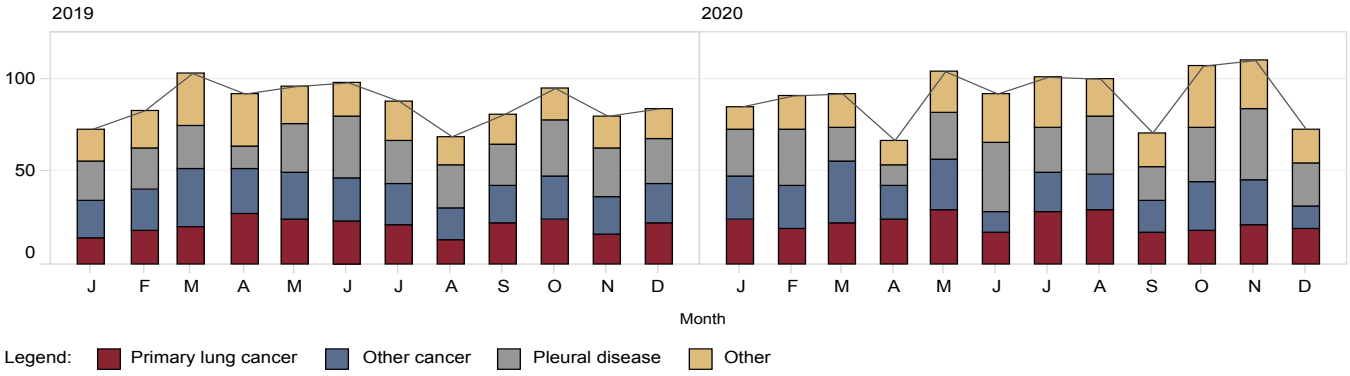


Figure 3: Proportion of all thoracic surgery cases by indication and month, 2019–2020

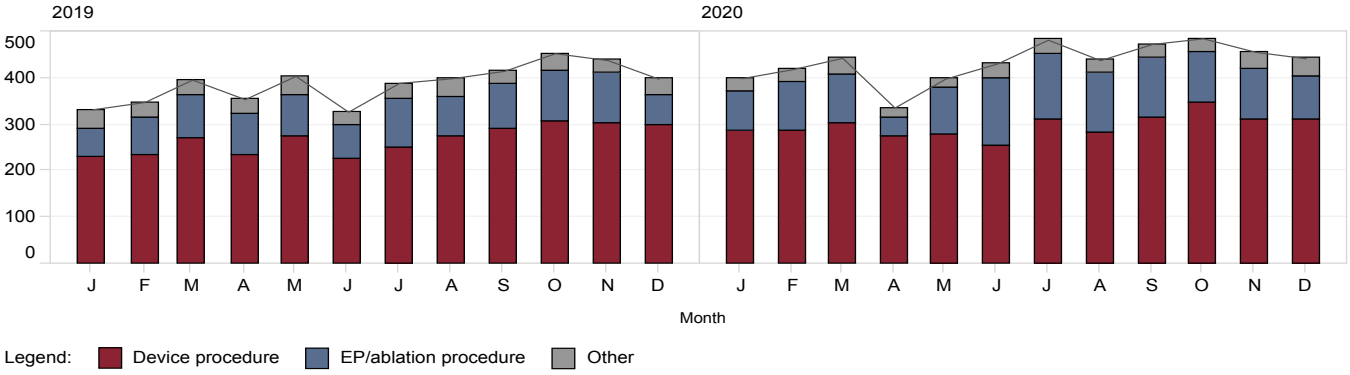


Figure 4: Proportion of all electrophysiology and pacing cases by procedure category and month, 2019–2020

9.3 Interstate and international patients

When examining the place of residence for patients undergoing cardiac interventions between 2019 and 2020, a notable decrease in the proportion of interstate and overseas patients was observed. The proportion of interstate patients reduced from 5.7% to 4.5%, while the proportion of overseas patients was almost halved (0.7% to 0.4%). This is reflective of travel restrictions in place, limiting international and interstate travel for a large part of 2020.

Table 2: Patient place of residence at time of procedure, 2019–2020

Service line	2019	2020
Queensland, %	93.6	95.1
Interstate, %	5.7	4.5
Overseas, %	0.7	0.4

Excludes missing data (0.1%)

9.4 Admission status

There was a reduced proportion of elective procedures and category 3 procedures observed across all service lines from 2019 to 2020. The reduction in elective cases appears to be concentrated around April 2020, coinciding with the announcement of the COVID-19 pandemic. These findings are likely reflective of the redistribution of clinical services in response to the pandemic as well as public health directives leading to a reduction in elective procedure bookings.

Table 3: Procedure status for interventional cardiology, cardiac surgery, thoracic surgery and electrophysiology and pacing by year, 2019–2020

Service line	2019	2020
Interventional cardiology, n	5,002	4,966
Elective, %	1,094 (21.9)	1,059 (21.3)
Urgent, %	2,719 (54.3)	2,585 (52.1)
Emergent, %	1,104 (22.1)	1,252 (25.2)
Salvage, %	87 (1.7)	70 (1.4)
Cardiac Surgery, n	2,622	2,651
Elective, %	1,523 (58.1)	1,472 (55.5)
Urgent, %	913 (34.8)	990 (37.3)
Emergent, %	169 (6.4)	185 (7.0)
Salvage, %	17 (0.6)	4 (0.2)
Thoracic surgery, n	1,042	1,093
Elective, %	730 (70.1)	719 (65.8)
Urgent, %	254 (24.4)	282 (25.8)
Emergent, %	58 (5.6)	92 (8.4)
Electrophysiology and pacing, n	4,654*	5,201†
Category 1, %	2,636 (56.6)	3,051 (58.7)
Category 2, %	1,143 (24.6)	1,365 (26.2)
Category 3, %	548 (11.8)	459 (8.8)

Category 1: Clinically indicated within 30 days

Category 2: Clinically indicated within 90 days

Category 3: Clinically indicated within 365 days

* 7.0% missing data

† 6.3% missing data

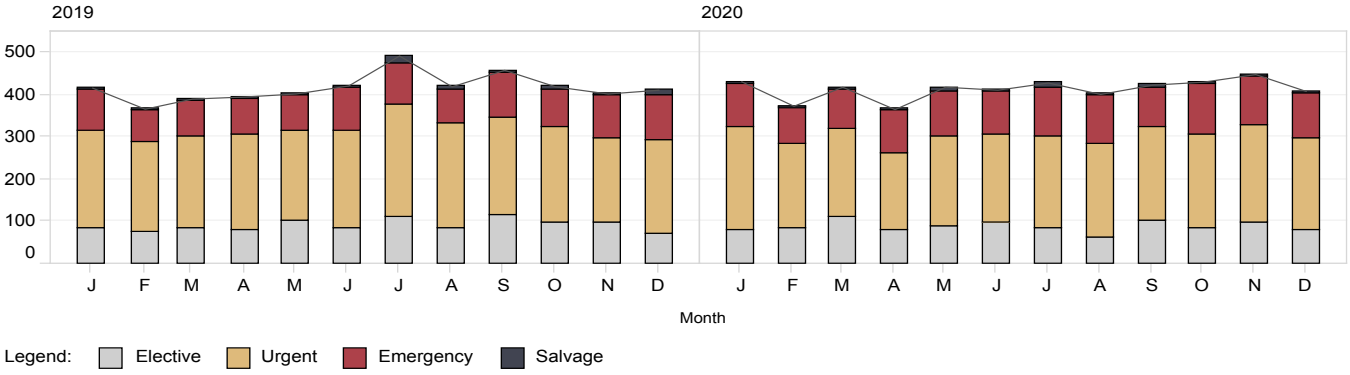


Figure 5: Proportion of all interventional cardiology cases by admission status and month, 2019–2020

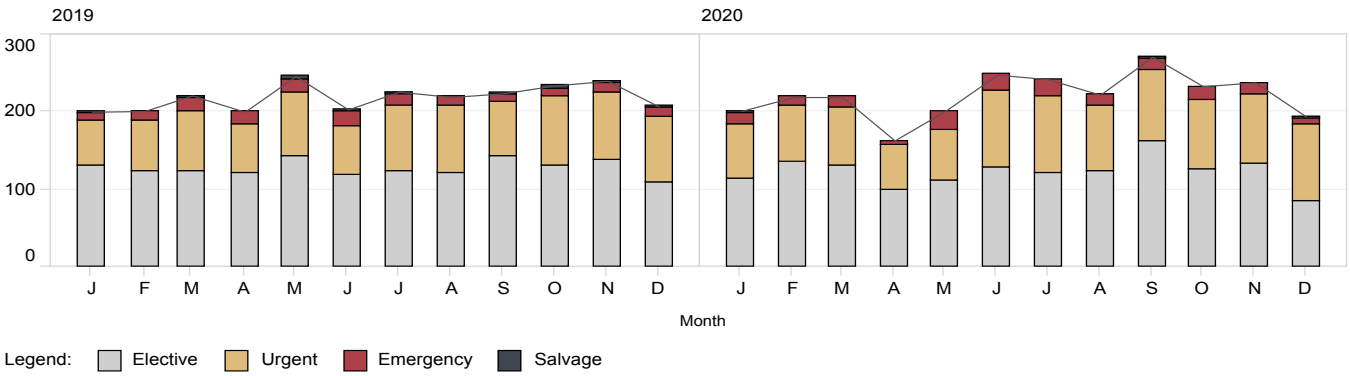


Figure 6: Proportion of all cardiac surgery cases by admission status and month, 2019–2020

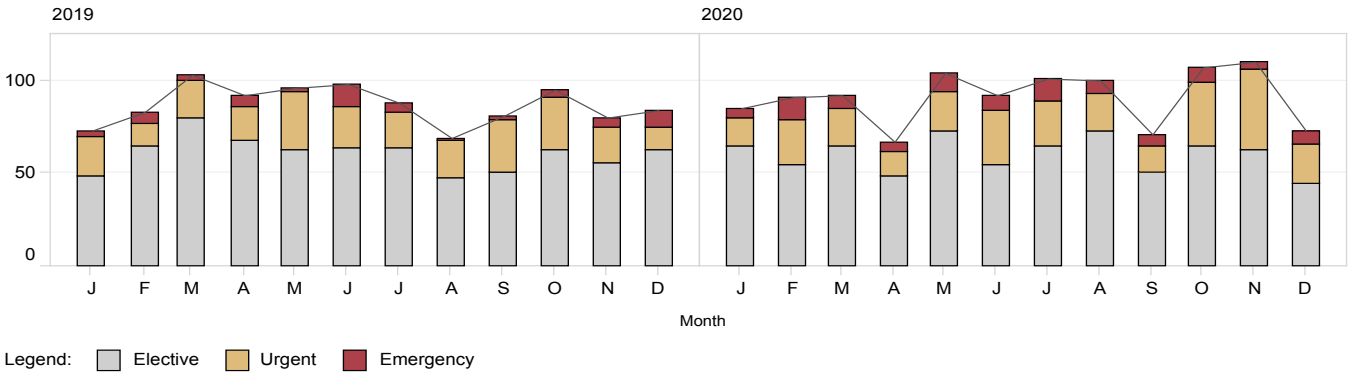
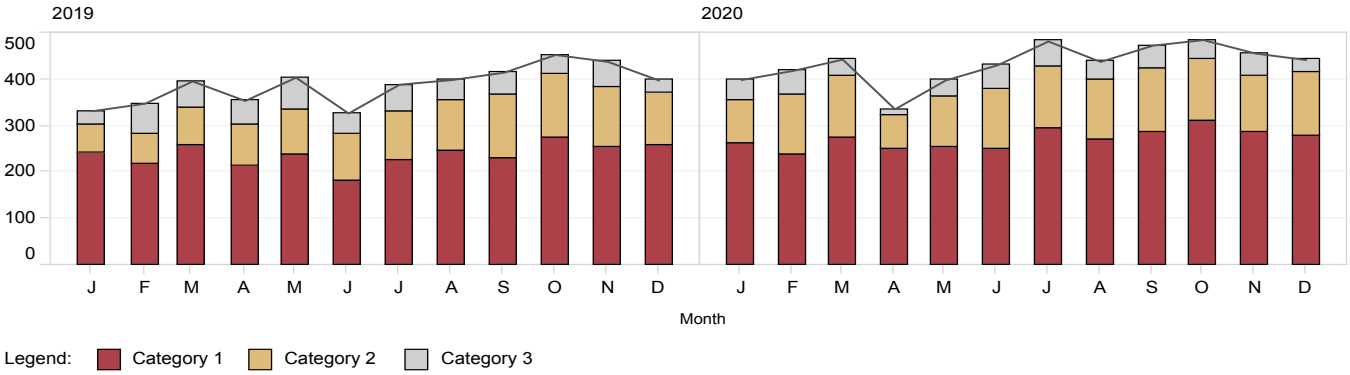


Figure 7: Proportion of all thoracic surgery cases by admission status and month, 2019–2020



Note: imputed missing data

Figure 8: Proportion of all electrophysiology and pacing cases by urgency status and month, 2019–2020

9.5 Outpatient support services

Cardiac rehabilitation services across the state were subject to disruption due to resources being redistributed to support the state's COVID-19 response. The overall number of referrals in 2020 was slightly less than 2019, with a total of 11,547 referrals vs. 11,177 referrals respectively. The greatest decline in incoming referrals was identified in April 2020 with a return to usual capacity over the following months.

Heart failure support services showed a 6.8% increase in referrals received in 2020 compared to 2019. As with most other cardiac services there was a decline in referrals in April 2020, followed by a steady increase in referrals through to December. The impacts on heart failure support services appear to have been limited.

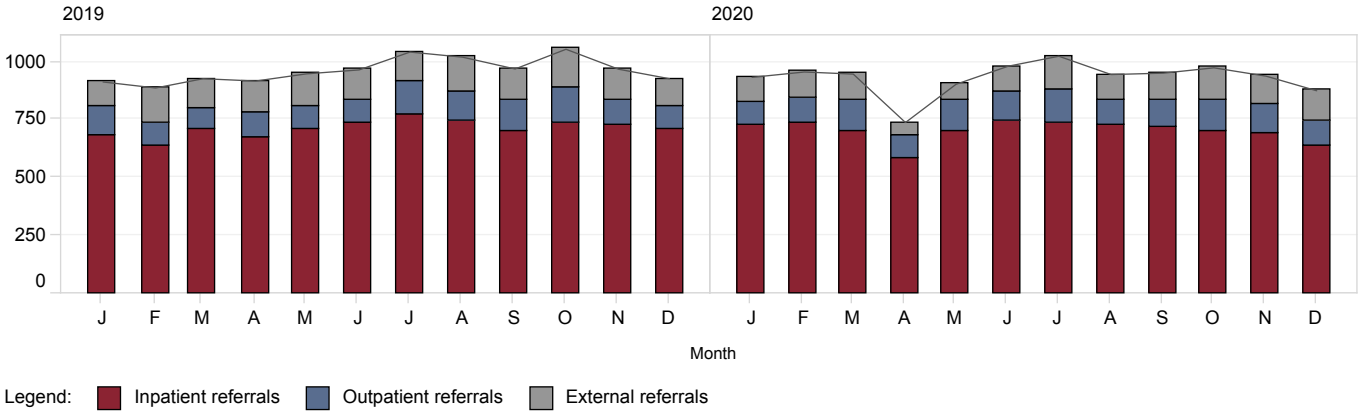


Figure 9: Cardiac rehabilitation referral source, 2019–2020

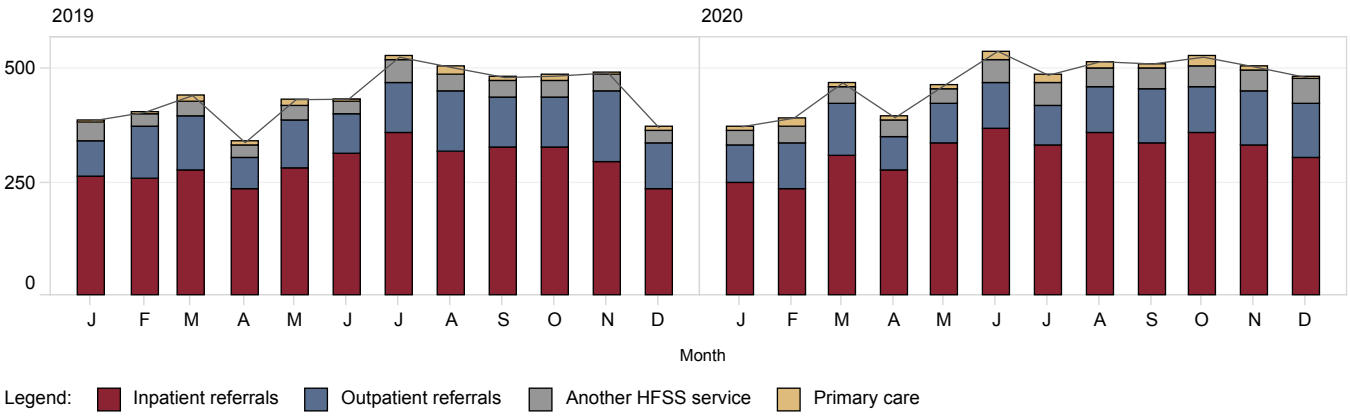


Figure 10: Heart failure support services referral source, 2019–2020

Table 4: Outpatient support services referral volumes, 2019–2020

Service line	2019 n	2020 n
Cardiac rehabilitation	11,547	11,177
Heart failure support services	5,304	5,664

9.6 Clinical performance indicators

Key clinical performance indicators for Queensland cardiac services in 2020 were largely improved compared to the previous year, though there were some areas where performance appears to have been negatively impacted by disruptions to scheduling and patient flow. It is difficult to draw conclusion as any impact is likely to be multifactorial. These issues are examined in more detail in the relevant sections of this report. However these results are suggestive that Queensland cardiac services have been largely insulated from significant impacts to service and performance as a result of the COVID-19 pandemic.

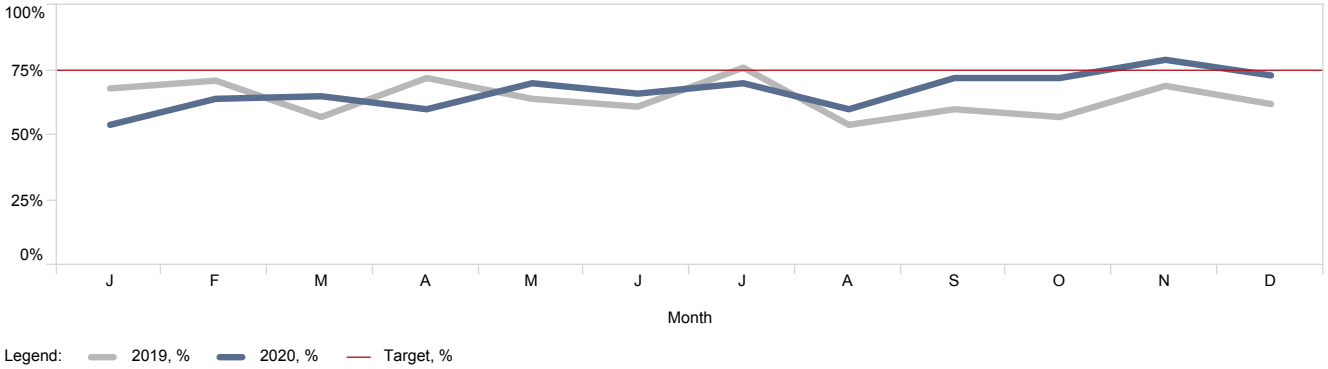


Figure 11: Proportion of ST-elevation myocardial infarction patients presenting within six hours of symptom onset who received an intervention within 90 minutes of first diagnostic electrocardiograph, 2019–2020

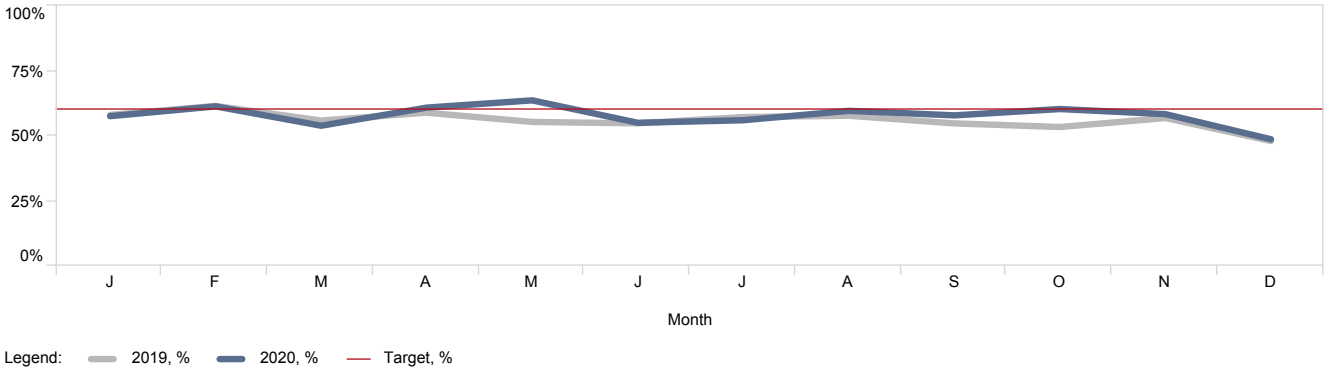


Figure 12: Cardiac rehabilitation performance measure, 2019–2020

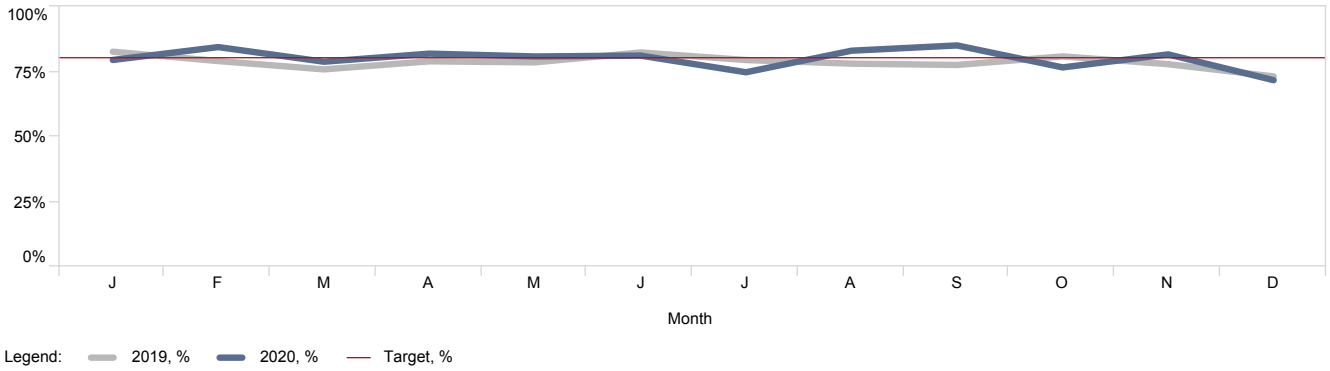


Figure 13: Heart failure support services clinical follow-up of acute patients within two weeks, 2019–2020

Table 5: Performance measures for interventional cardiology, electrophysiology and pacing, cardiac rehabilitation and heart failure support services by year, 2019–2020

Service line	2019	2020
Interventional cardiology		
Proportion of STEMI* patients presenting within six hours of symptom onset who received an intervention within 90 minutes of first diagnostic ECG (%)	65	67
Proportion of STEMI* patients with arrival at PCI facility to first device time less than 60 minutes (%)	70	70
Proportion of all NSTEMI† patients who received angiography within 72 hours of first hospital admission (%)	60	69
Electrophysiology and pacing		
Median wait time for elective pacemaker implantation (days)	21	3
Median wait time for elective ICD‡ implantation (days)	32	36
Median wait time for elective standard ablation (days)	117	99
Median wait time for elective complex ablation (days)	65	104
Cardiac rehabilitation		
Timely referral – documented referral to CR within three days of discharge (%)	94	93
Timely assessment (inpatients) – initial CR pre assessment completed within 28 days of discharge date (%)	59	62
Timely assessment (non acute patients) – proportion of CR patients completing a CR pre assessment within 28 days of referral date (%)	61	57
Timely journey (inpatients) – composite of timely referral and assessment (%)	56	58
Heart failure support services		
Follow-up of acute patients within two weeks (%)	79	80
Follow-up of non acute patients within four weeks (%)	82	84
Assessment of left ventricular ejection fraction within two years (%)	96	96
ACEI/ARB§ or ARNI‖ prescription at hospital discharge (%)	92	92
ACEI/ARB§ or ARNI‖ at first clinical review (%)	90	92
Beta blocker prescription at hospital discharge (%)	89	92
Beta blocker prescription at first clinical review (%)	91	92
Prescription of MRA# for HFrEF** at time of hospital discharge (%)	45	46
Prescription of MRA# for HFrEF†† at time of first HFSS clinical review (%)	43	46
Beta blocker titration status review at six months post referral (%)	67	75
Beta blocker achievement of guideline recommended target (%)	35	32
Beta blocker achievement of guideline recommended target dose or maximum tolerated dose (%)	75	77

* ST-elevation myocardial infarction

† Non-ST-elevation myocardial infarction

‡ Implantable cardioverter defibrillator

§ Angiotensin converting enzyme inhibitor/angiotensin II receptor blocker

‖ Angiotensin receptor-neprilysin inhibitor

Mineralocorticoid receptor antagonists

** Heart failure with reduced ejection fraction

†† Heart failure with preserved ejection fraction

10 Facility profiles

10.1 Cairns Hospital

- Referral hospital for Cairns and Hinterland and Torres and Cape Hospital and Health Services, serving a population of approximately 280,000
- Public tertiary level invasive cardiac services provided at Cairns Hospital include:
  - Coronary angiography
  - Percutaneous coronary intervention
  - Structural heart disease intervention
  - ICD, CRT and pacemaker implantation

10.2 Townsville University Hospital

- Referral hospital for Townsville and North West Hospital and Health Services, serving a population of approximately 295,000
- Public tertiary level invasive cardiac services provided at Townsville University Hospital include:
  - Coronary angiography
  - Percutaneous coronary intervention
  - Structural heart disease intervention
  - Electrophysiology
  - ICD, CRT and pacemaker implantation
  - Cardiothoracic surgery

10.3 Mackay Base Hospital

- Referral hospital for Mackay and Whitsunday regions, serving a population of approximately 182,000
- Public tertiary level invasive cardiac services provided at Mackay Base Hospital include:
  - Coronary angiography
  - Percutaneous coronary intervention
  - ICD and pacemaker implants

10.4 Sunshine Coast University Hospital

- Referral hospital for Sunshine Coast and Wide Bay Hospital and Health Services, serving a population of approximately 563,000
- Public tertiary level invasive cardiac services provided at Sunshine Coast University Hospital include:
  - Coronary angiography
  - Percutaneous coronary intervention
  - Structural heart disease intervention
  - Electrophysiology
  - ICD, CRT and pacemaker implantation

10.5 The Prince Charles Hospital

- Referral hospital for Metro North, Wide Bay and Central Queensland Hospital and Health Services, serving a population of approximately 900,000 (shared referral base with the Royal Brisbane and Women's Hospital)
- Public tertiary level invasive cardiac services provided at The Prince Charles Hospital include:
  - Coronary angiography
  - Percutaneous coronary intervention
  - Structural heart disease intervention
  - Electrophysiology
  - ICD, CRT and pacemaker implantation
  - Cardiothoracic surgery
  - Heart/lung transplant unit
  - Adult congenital heart disease unit

10.6 Royal Brisbane & Women's Hospital

- Referral hospital for Metro North, Wide Bay and Central Queensland Hospital and Health Services, serving a population of approximately 900,000 (shared referral base with The Prince Charles Hospital)
- Public tertiary level invasive cardiac services provided at The Royal Brisbane and Women's Hospital include:
  - Coronary angiography
  - Percutaneous coronary intervention
  - Structural heart disease intervention
  - Electrophysiology
  - ICD, CRT and pacemaker implantation
  - Thoracic surgery

10.7 Queensland Children's Hospital

- Children's Health Queensland is a specialist statewide Hospital and Health Service dedicated to caring for children and young people from across Queensland and northern New South Wales
- Public tertiary level invasive cardiac services provided at the Queensland Children's Hospital include:
  - Percutaneous congenital cardiac abnormality diagnostics and intervention
  - Electrophysiology
  - ICD and pacemaker implantation
  - Paediatric cardiac and thoracic surgery

10.8 Princess Alexandra Hospital

- Referral hospital for Metro South and South West Hospital and Health Services, serving a population of approximately 1,000,000
- Public tertiary level invasive cardiac services provided at the Princess Alexandra Hospital include:
  - Coronary angiography
  - Percutaneous coronary intervention
  - Structural heart disease intervention
  - Electrophysiology
  - ICD, CRT and pacemaker implantation
  - Cardiothoracic surgery

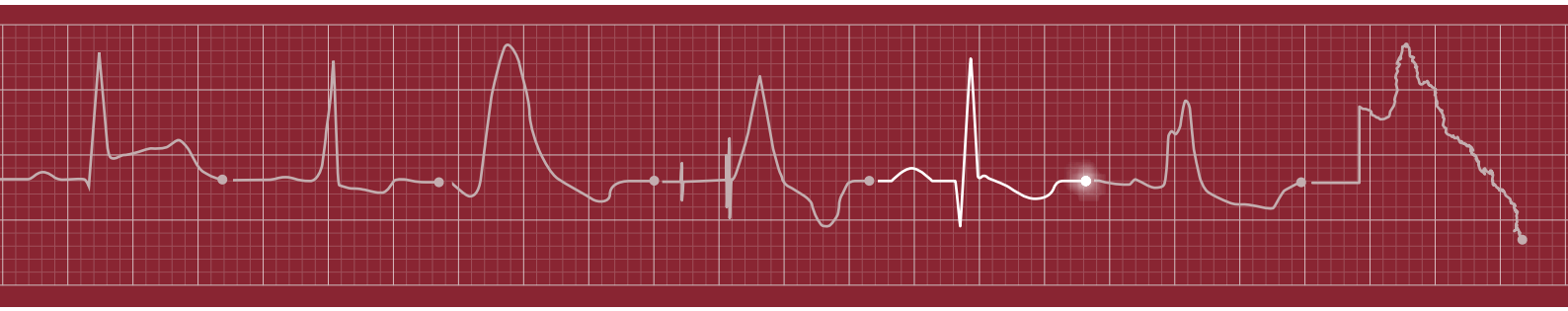
10.9 Toowoomba Hospital

- Referral hospital for Darling Downs Hospital and Health Services, servicing a population of approximately 280,000
- Public invasive cardiac services provided at the Toowoomba Hospital include:
  - ICD, CRT and pacemaker implantation

10.10 Gold Coast University Hospital

- South Wales regions, serving a population of approximately 700,000
- Public tertiary level invasive cardiac services provided at the Gold Coast University Hospital include:
  - Coronary angiography
  - Percutaneous coronary intervention
  - Structural heart disease intervention
  - Electrophysiology
  - ICD, CRT and pacemaker implantation
  - Cardiothoracic surgery

Cardiac Rehabilitation Audit



1 Message from the QCOR Cardiac Rehabilitation Committee

This 2020 report for cardiac rehabilitation (CR) services in Queensland has seen a considerable shift in the offering and delivery of throughout Queensland due to unprecedented changes brought about by the COVID-19 global pandemic. The report shows that CR practitioners have worked with agility, fortitude and resilience to maintain consistently world-class levels of care. This report for CR services in 2020 exemplifies this, demonstrating how patient care was maintained and quality preserved in the face of such challenges.

COVID-19 temporarily closed some outpatient programs due to the redeployment of staff to other areas of healthcare, or the reclaiming of gym spaces to deliver pop up COVID-19 screening clinics and vaccination hubs. Public health directives also placed restrictions on outpatient programs by limiting the number of people per square metre and mandating the use of face masks. All outpatient programs responded well to these challenges, and many adapted their services to continue to deliver a form of CR to this vulnerable group of patients.

There were considerable changes to the mode of service delivery for many sites, such as a transition to increased use of telephone-based service delivery, or services trailing the use of video platforms for individual and group-based exercise. Where possible, all sites tended to retain face to face assessment before entry into these models of care. Much preparation has occurred in recent times to build clinician capability in delivering a video-based CR program, in the event clinicians are required to continue this delivery model. An incidental positive outcome of exploring these alternate models of care is that capacity has improved to deliver services to clients previously unable to attend due to geography.

This report further expands the analysis into patients who decline the opportunity to attend outpatient CR at both the time of referral and time of assessment or may be declined by their local CR program based on their own local service criteria. This report expands on the previous analysis around these patients to examine barriers to participation between males and females, by place of residence, diagnostic category and according to the patient's most recent procedure. As the CR registry continues to grow and encompass further data, we look forward to expanding insights into this cohort to better understand, predict and tailor CR programs to better serve all Queensland patients.

Further developments of the QCOR CR system will allow mapping and correlation of the various models of care that exist throughout the state, allowing further investigation of how these variations may impact on clinical outcomes. This is in addition to the outstanding service and quality offerings delivered via QCOR and the SCCIU initiatives. None of this would be possible without the tireless work of CR staff and clinicians and we sincerely thank you for the contribution to ensuring quality care.

On behalf of the
QCOR Cardiac Rehabilitation Committee

2 Key findings

This fourth Cardiac Rehabilitation (CR) Audit examines the characteristics and outcomes for patients referred to and assessed by public CR services in Queensland. It also outlines clinical indicator performance for participating services.

- There were 59 public cardiac rehabilitation (CR) sites that contributed data to QCOR.
- A total of 11,177 referrals were made to public CR programs across Queensland. A further 1,070 referrals were declined, unsuitable or referred outside of Queensland Health at the point of first contact.
- Approximately 75% of all referrals originated from an inpatient setting, while 12% of referrals originated from outside of Queensland Health.
- There were 7,175 of referrals (64%) which proceeded to a pre assessment by CR. The most common reasons that the pre assessment did not take place was that the patient declined, was medically unsuitable or inappropriate, had been uncontactable or failed to attend the appointment.
- Male patients accounted for 70% of all CR pre assessments.
- The median age of patients was 66 years, with three quarters of patients aged 57 years and above. There was considerable variation in median age between Aboriginal and Torres Strait Islander patients (56 years) and patients of other descent (66 years).
- The total proportion of Aboriginal and Torres Strait Islander patients was 7%. Large geographical variance was noted, with sites in North Queensland having a significantly higher proportion of Aboriginal and Torres Strait Islander patients.
- Overall, 66% of referrals had a pre assessment diagnosis of ischaemic heart disease.
- At pre assessment, 80% of patients were classed as having an unhealthy body mass index (BMI) including 36% classed as overweight, 37% obese and 7% morbidly obese.
- The most common procedure undergone by patients who attended a CR pre assessment was a percutaneous coronary intervention, which had been performed for 41% of patients. There were 18% of patients who had undergone coronary artery bypass grafting.
- Only 39% of patients were recorded as being sufficiently active at pre assessment.
- Completion of a timely referral for Queensland Health inpatients (within 3 days of discharge from hospital) was achieved in 93% of cases.
- A timely overall journey occurred in 58% of cases (Queensland Health inpatients referred within 3 days of discharge and assessed by CR program within 28 days of discharge).
- 41% of patients who completed a pre assessment continued CR to the completion of a post assessment.
- The majority of patients completing a post assessment reported an improved health status following completion of CR, regardless of which measure was used.

3 Participating sites

Table 1: Participating CR sites

Legend: ⊘ Engaged and contributing ◑ Partially contributing (‹50% of referrals) ○ Not contributing

HHS/Organisation	CR program	Locations	2017	2018	2019	2020
Cairns and Hinterland	Cairns Outpatient CR Program	Cairns	⊘	⊘	⊘	⊘
	Cassowary Area CR	Innisfail, Tully	⊘	⊘	⊘	⊘
	Tablelands CR	Atherton, Mareeba	⊘	⊘	⊘	⊘
	Mossman CR and Prevention Program	Mossman	⊘	⊘	⊘	⊘
Central Queensland	Community Health CR	Gladstone	⊘	⊘	⊘	⊘
	Biloela CR Program	Biloela	⊘	⊘	⊘	⊘
	CR Outpatient Program	Rockhampton, Capricorn Coast	⊘	⊘	⊘	⊘
	Mount Morgan CR	Mount Morgan†	–	–	⊘	⊘
Central West	Longreach and Central West CR Program	Longreach	⊘	⊘	⊘	⊘
		Blackall*	–	⊘	⊘	⊘
		Winton†	–	–	⊘	⊘
		Barcaldine‡	–	–	–	⊘
Darling Downs	Toowoomba Hospital Heart Care	Toowoomba	⊘	⊘	⊘	⊘
	Warwick CR Service	Warwick	⊘	⊘	⊘	⊘
	Chinchilla-Miles CR Service	Chinchilla, Miles	⊘	⊘	⊘	⊘
	Dalby-Tara CR Service	Dalby, Tara	⊘	⊘	⊘	⊘
	Kingaroy Hospital South Burnett CR	Kingaroy	⊘	⊘	⊘	⊘
	Goondiwindi CR	Goondiwindi	○	○	⊘	⊘
	Texas OPCR Program	Texas†	–	–	⊘	○
	Stanthorpe Health CR Program	Stanthorpe	○	○	○	○
Gold Coast	Gold Coast Heart Health Service	Robina	⊘	⊘	⊘	⊘
HCC§	SMoCC‖	Health Contact Centre	⊘	⊘	⊘	⊘
Mackay	Mackay Heart Health Service	Mackay	⊘	⊘	⊘	⊘
	Mackay Rural District CR	Proserpine, Bowen	⊘	◑	○	○
Metro North	Complex Chronic Disease	Caboolture, Chermside, North Lakes, Redcliffe	⊘	⊘	⊘	⊘
	TPCH Cardiac Rehabilitation Service‡	The Prince Charles Hospital#	–	–	–	⊘
Metro South	PAH Heart Recovery Program	Princess Alexandra Hospital	⊘	⊘	⊘	⊘
	Bayside CR Program	Redland	⊘	⊘	⊘	⊘
	Brisbane South CR Service	Eight Mile Plains, Inala	⊘	⊘	⊘	⊘
	Logan-Beaudesert CR Service	Browns Plains	⊘	⊘	⊘	⊘
North West	North West CR Program	Mount Isa	⊘	⊘	⊘	⊘
South West	South West HHS CR Services	Charleville, Roma	⊘	⊘	⊘	⊘
		St George*	–	⊘	⊘	⊘
Sunshine Coast	Sunshine Coast HHS Cardiac Rehab	Caloundra, Gympie, Maroochydore, Nambour, Noosa	⊘	⊘	⊘	⊘
Townsville	Townsville CR Outpatient Program	Townsville	⊘	⊘	⊘	⊘
	Ingham CR Outpatient Program	Ingham	⊘	◑	◑	○
	Charters Towers CR	Charters Towers	○	◑	◑	◑
	Ayr Health Service	Ayr	○	○	○	◑
West Moreton	Ipswich and West Moreton CR	Ipswich, Boonah, Esk, Gatton, Laidley	⊘	⊘	⊘	⊘
Wide Bay	Fraser Coast CR	Hervey Bay, Maryborough	⊘	⊘	⊘	⊘
	Wide Bay Rural and Allied Health*	Biggenden, Eidsvold, Gayndah, Mundubbera	–	⊘	⊘	⊘

* New service commencing in 2018
† New service commencing in 2019
‡ New service commencing in 2020
§ Health Contact Centre
‖ Self Management of Chronic Conditions (delivering the COACH program)
Temporary service as part Metro North HHS COVID-19 response

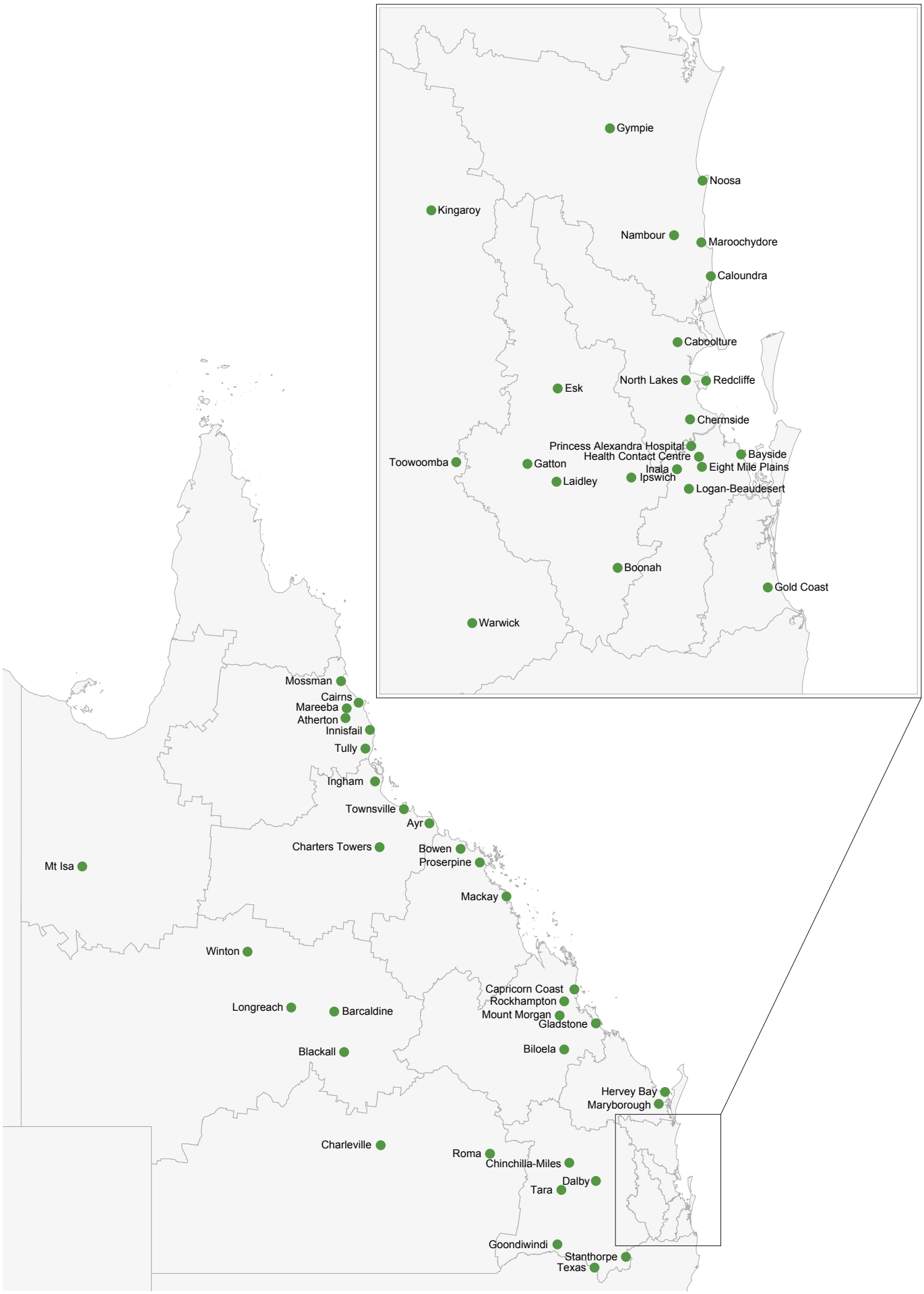


Figure 1: Map of Queensland public CR sites

4 Total referrals

4.1 Statewide

The volume of cardiac rehabilitation (CR) referrals entered into the QCOR clinical application expanded through 2020 to include an additional 11,177 new referrals for the calendar year. This brings the overall total to over 40,000 referrals since data collection commenced in July 2017.

Clinicians at 59 Queensland CR sites have incorporated data entry into their daily practices. A smaller number of sites deliver public outpatient CR but contribute to the database inconsistently or not at all. This can be a result of various factors such as resource availability. These sites remain a focus for engagement and involvement.

There is now an increased level of detail that can be recorded in the QCOR module in cases where the patient declined or was unsuitable to participate in CR. This has increased the availability of data, allowing these cases to be examined in more detail.

The majority of referrals (75%) originated from a public inpatient setting with smaller numbers originating from external and outpatient settings.

A major impact for the 2020 year has been the global COVID-19 pandemic, the effects of which are examined earlier in this publication.

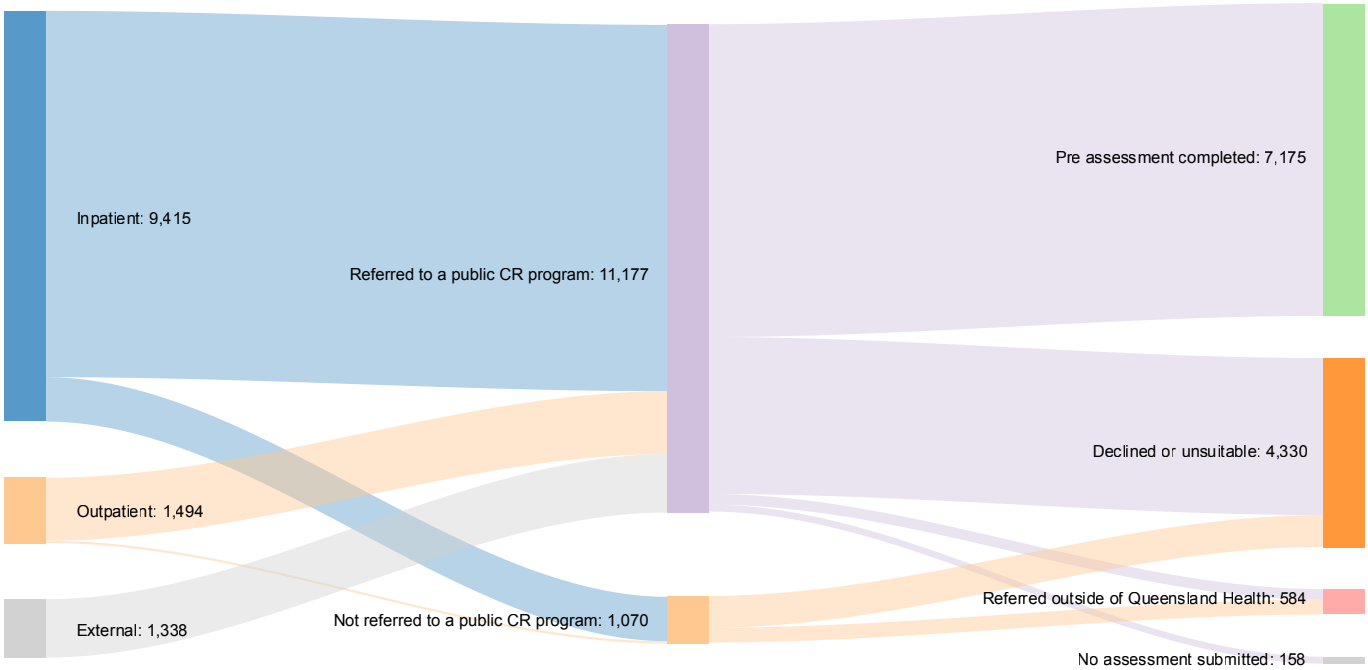


Figure 2: Statewide cardiac rehabilitation referrals flow

Patients were located across a wide geographical area with the majority residing in population centres along the Eastern Seaboard (Figure 3).

More than half of all patients were residing in major cities, and the remainder in regional and remote areas of Queensland. This is consistent with the decentralised distribution of the population within the state.

It is important to note that referrals for patients residing interstate or overseas are not generally accepted by Queensland public CR programs. The inclusion of these data is reflective of local site processes and may also vary based on available resources.

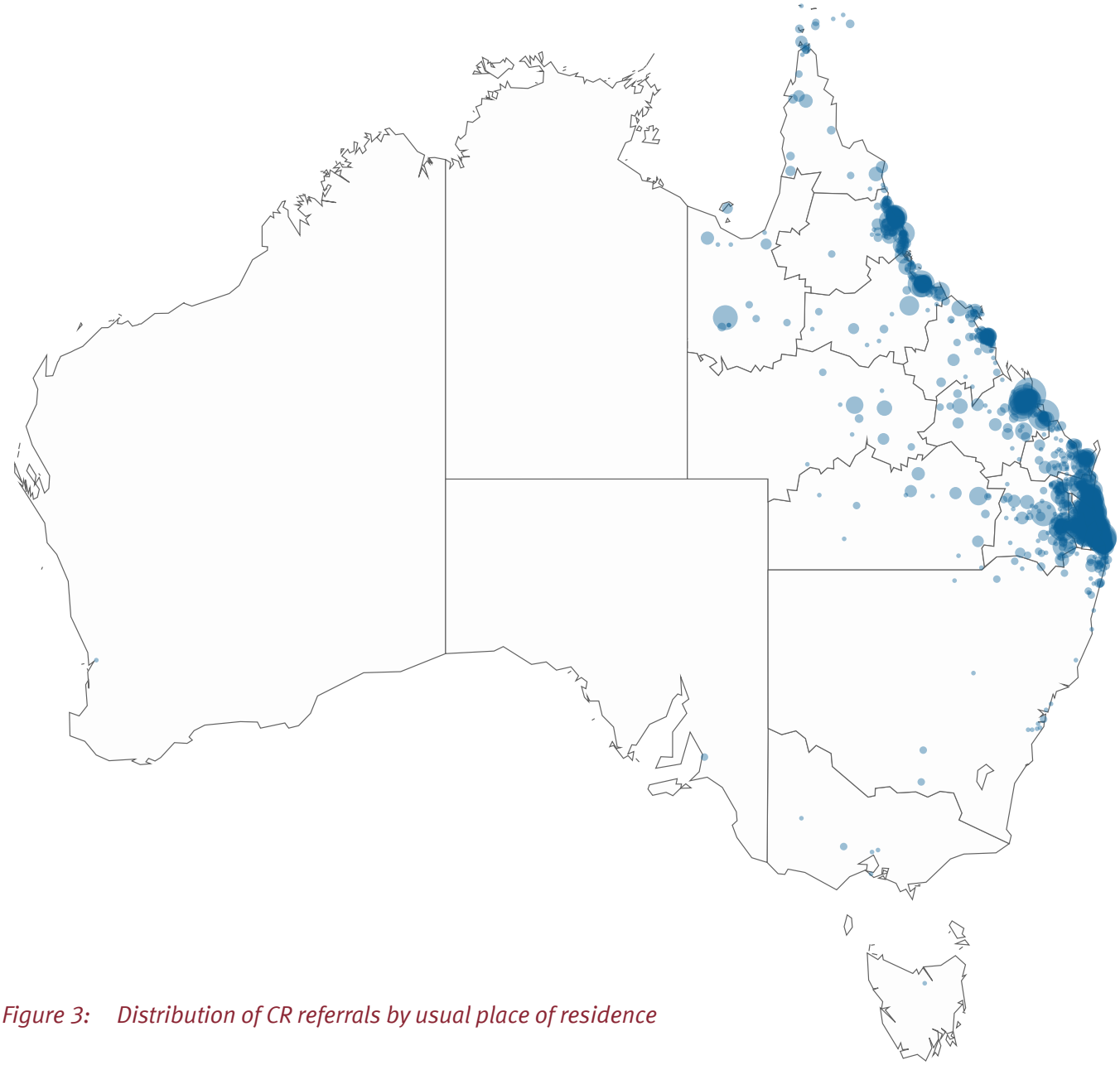


Figure 3: Distribution of CR referrals by usual place of residence

Table 2: CR referrals by remoteness classification

Remoteness area*	%
Major Cities of Australia	52.6
Inner Regional Australia	26.9
Outer Regional Australia	16.9
Remote Australia	1.4
Very Remote Australia	2.2
ALL	**100.0**

Excludes missing data (0.6%)

* Classified by Australian Statistical Geography Standard remoteness area

4.2 Origin of referrals

The majority of referrals (75%) originated from an inpatient setting, with smaller proportions of referrals flowing to CR from an outpatient setting (13%) and outside of Queensland Health (12%).

There was considerable variation across participating CR programs in the proportion of referrals from external sources, which ranged from <1% to 26%. It is possible that not all sites are entering referrals received from general practitioners, private hospitals or external specialists.

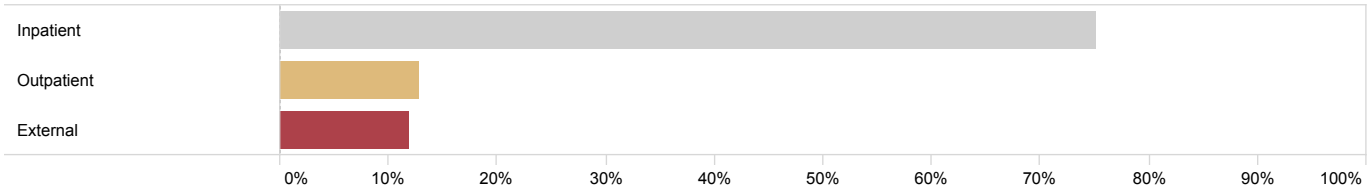


Figure 4: Proportion of referrals by referral source

Table 3: Referral sources by outpatient program HHS

HHS/division	Total referrals n	Inpatient* n (%)	Outpatient* n (%)	External n (%)
Cairns and Hinterland	753	686 (91.1)	32 (4.2)	35 (4.6)
Central Queensland	1,026	612 (59.6)	205 (20.0)	209 (20.4)
Central West	41	21 (51.2)	19 (46.3)	1 (2.4)
Darling Downs	497	346 (69.6)	64 (12.9)	87 (17.5)
Gold Coast	1,578	1,329 (84.2)	171 (10.8)	78 (4.9)
Health Contact Centre	1,253	1,042 (83.2)	162 (12.9)	49 (3.9)
Mackay	285	175 (61.4)	109 (38.2)	1 (0.4)
Metro North	1,421	1,008 (70.9)	161 (11.3)	252 (17.7)
Metro South	1,706	1,256 (73.6)	100 (5.9)	350 (20.5)
North West	64	44 (68.8)	17 (26.6)	3 (4.7)
South West	62	28 (45.2)	20 (32.3)	14 (22.6)
Sunshine Coast	956	860 (90.0)	43 (4.5)	53 (5.5)
Townsville	490	379 (77.3)	108 (22.0)	3 (0.6)
West Moreton	763	370 (48.5)	194 (25.4)	199 (26.1)
Wide Bay	282	241 (85.5)	37 (13.1)	4 (1.4)
Statewide	**11,177**	**8,397 (75.1)**	**1,442 (12.9)**	**1,338 (12.0)**

* Includes referrals from a Queensland Health public facility

4.3 Inpatient referrals

For referrals originating from an inpatient setting, the largest referrer was Metro North HHS which accounted for one quarter (25%) of these referrals. Gold Coast HHS and Metro South HHS received the largest volumes of inpatient referrals (16% and 15% respectively).

Table 4: CR inpatient referrals by source and destination HHS

HHS/organisation	Outgoing inpatient referrals n (%)	Incoming inpatient referrals n (%)
Cairns and Hinterland	705 (8.4)	686 (8.2)
Central Queensland	381 (4.5)	612 (7.3)
Central West	–	21 (0.3)
Darling Downs	131 (1.6)	346 (4.1)
Gold Coast	1,345 (16.0)	1,329 (15.8)
Health Contact Centre	–	1,042 (12.4)
Mackay	92 (1.1)	175 (2.1)
Mater Health Services	95 (1.1)	–
Metro North	2,093 (24.9)	1,008 (12.0)
Metro South	1,775 (21.1)	1,256 (15.0)
North West	–	44 (0.5)
South West	1 (<0.1)	28 (0.3)
Sunshine Coast	787 (9.4)	860 (10.2)
Townsville	791 (9.4)	379 (4.5)
West Moreton	134 (1.6)	370 (4.4)
Wide Bay	67 (0.8)	241 (2.9)
Statewide	**8,397 (100.0)**	**8,397 (100.0)**

The flow of inpatient referrals from the originating HHS or organisation (acute site) to the CR outpatient program HHS is illustrated in Figure 5. The majority of inpatient referrals remained within the originating HHS, though there was some variation noted.

It should be highlighted that there are no outpatient programs for Mater Health Services, and conversely the Health Contact Centre provides an outpatient (telephone based) service only.

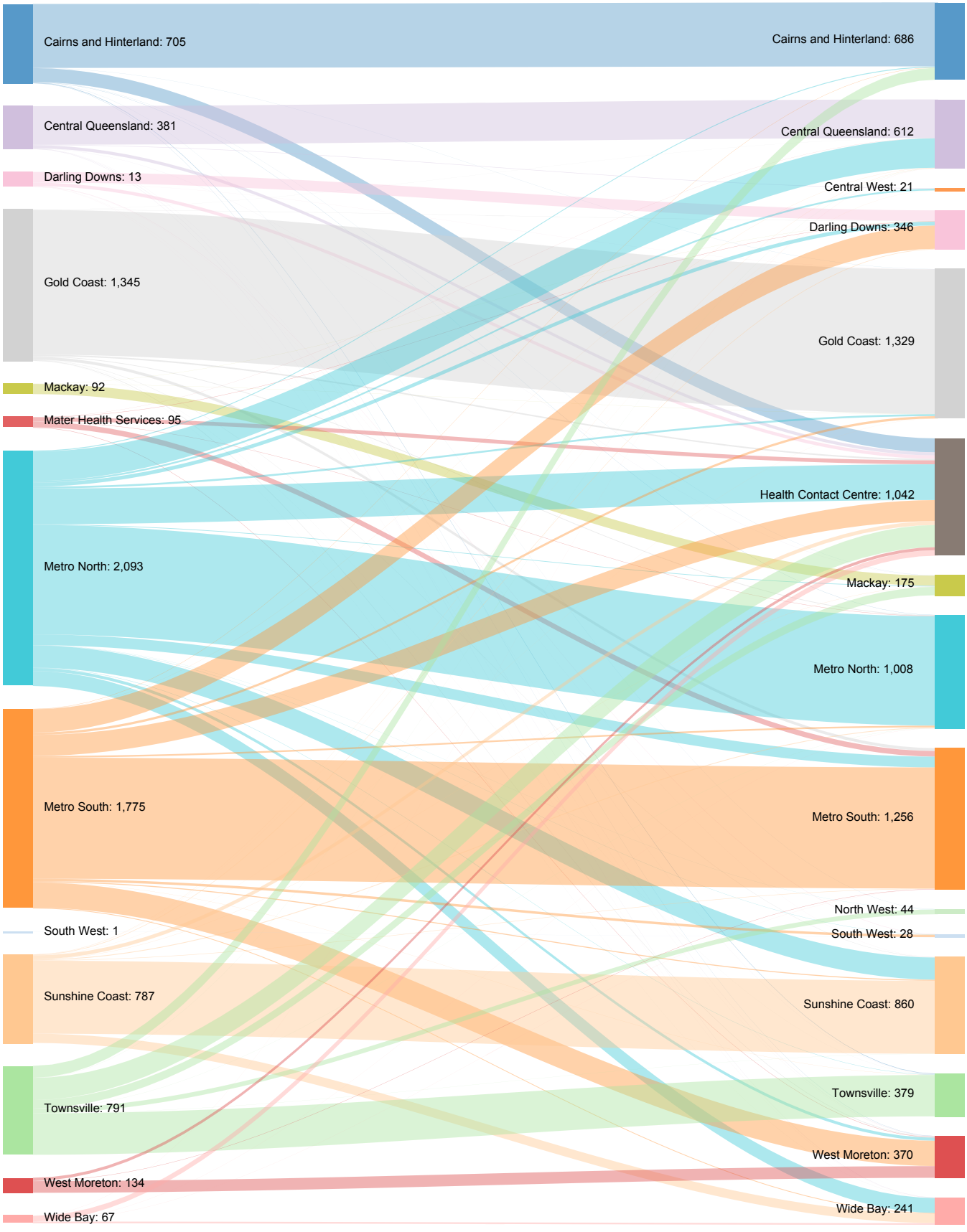


Figure 5: CR inpatient referrals by source and destination HHS

5 Program participation

5.1 Pre assessment stage

The assessment of a patient attending CR comprises a comprehensive cardiovascular disease risk factor review. This extends beyond a patient's presenting medical and social history to encompass overall health, physical well-being, psychological factors, availability of social support and patient-reported quality of life.

An assessment within outpatient CR is generally conducted in two stages which occur before and after a patient attends the specialist CR program. These stages are referred to as the pre assessment and post assessment. The pre assessment signifies the successful enlistment of a patient onto the CR program. Assessments may be undertaken over the phone or face-to-face.

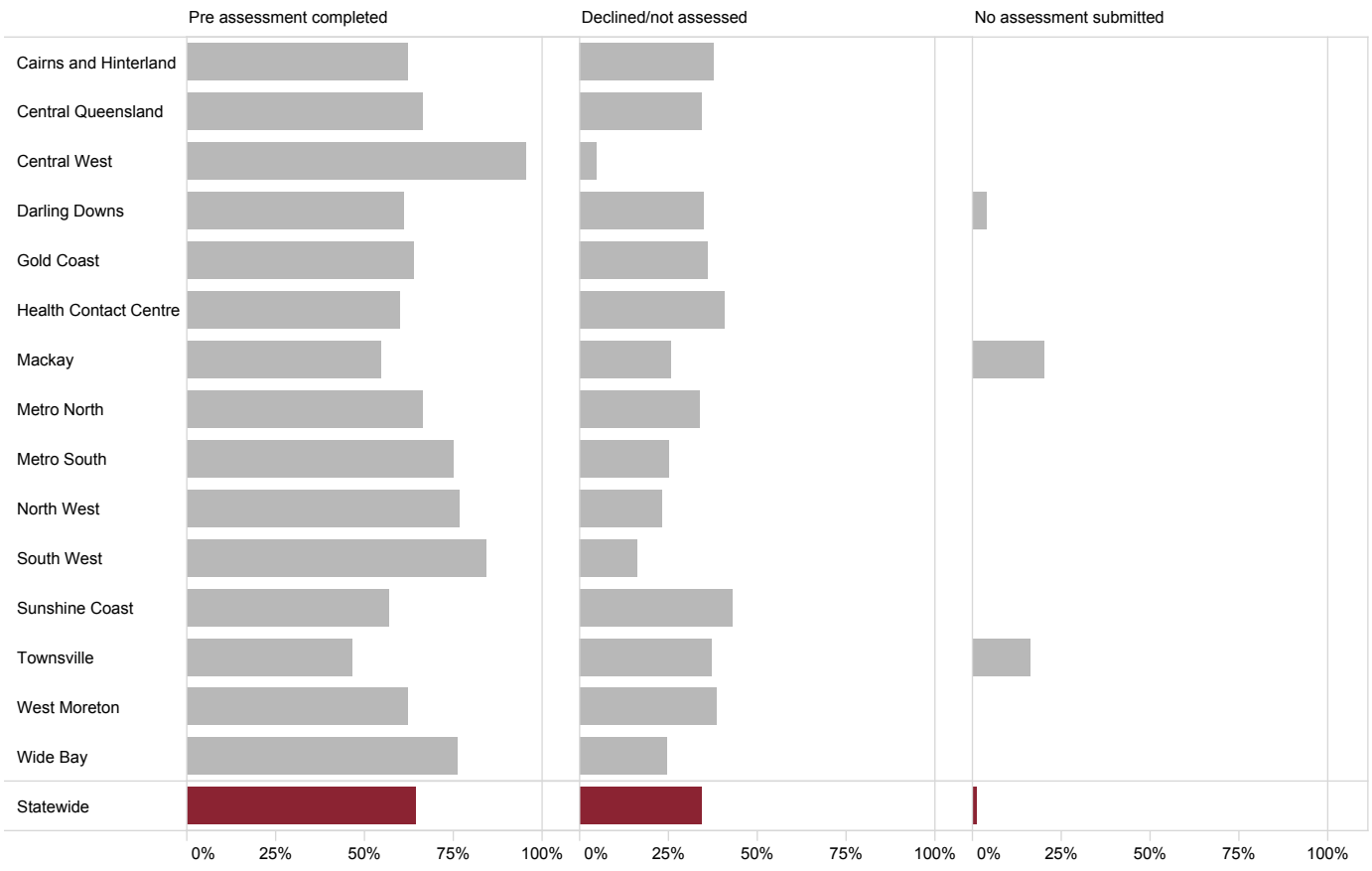
The proportion of total referrals which proceeded to a pre assessment within any timeframe was 64%. This is a limited metric which should be interpreted with caution due to varying processes across the state for patients refusing or not interested in attending CR, and for patients residing overseas and interstate.

Capacity for service delivery is also a contributing factor for referrals not proceeding to pre assessment, these issues are explored later in the report.

Table 5: Total pre assessments completed by outpatient HHS/division

Outpatient HHS/division	Pre assessment completed n (%)	Declined/not assessed n (%)	No assessment submitted n (%)
Cairns and Hinterland	467 (62.0)	286 (38.0)	–
Central Queensland	676 (65.8)	352 (34.2)	–
Central West	39 (95.1)	2 (4.9)	–
Darling Downs	303 (60.8)	175 (35.1)	20 (4.0)
Gold Coast*	1,007 (63.8)	571 (36.2)	–
Health Contact Centre	746 (59.5)	507 (40.5)	–
Mackay	155 (54.4)	72 (25.3)	58 (20.4)
Metro North	940 (66.2)	481 (33.8)	–
Metro South	1,281 (75.1)	425 (24.9)	–
North West	49 (76.6)	15 (23.4)	–
South West	52 (83.9)	10 (16.1)	–
Sunshine Coast	546 (57.1)	410 (42.9)	–
Townsville	228 (46.5)	182 (37.1)	80 (16.3)
West Moreton	472 (61.9)	291 (38.1)	–
Wide Bay	214 (75.9)	68 (24.1)	–
Statewide	**7,175 (64.2)**	**3,847 (34.4)**	**158 (1.4)**

* Referrals to Gold Coast HHS include 11% patients residing interstate, typically referred on for CR outside of Queensland Health



Total for Gold Coast HHS includes 11% referrals for patients residing interstate

Figure 6: Proportion of CR referrals proceeding to pre assessment by outpatient HHS/division

5.2 Post assessment stage

In most cases, the post assessment is representative of completion and graduation from the specialist CR outpatient program. This provides an opportunity for the patient and clinician to reflect upon the targets defined at the pre assessment and discuss the impact of the program. Of 7,175 completed pre assessments, 41% proceeded to post assessment which compares similarly to the previous year.

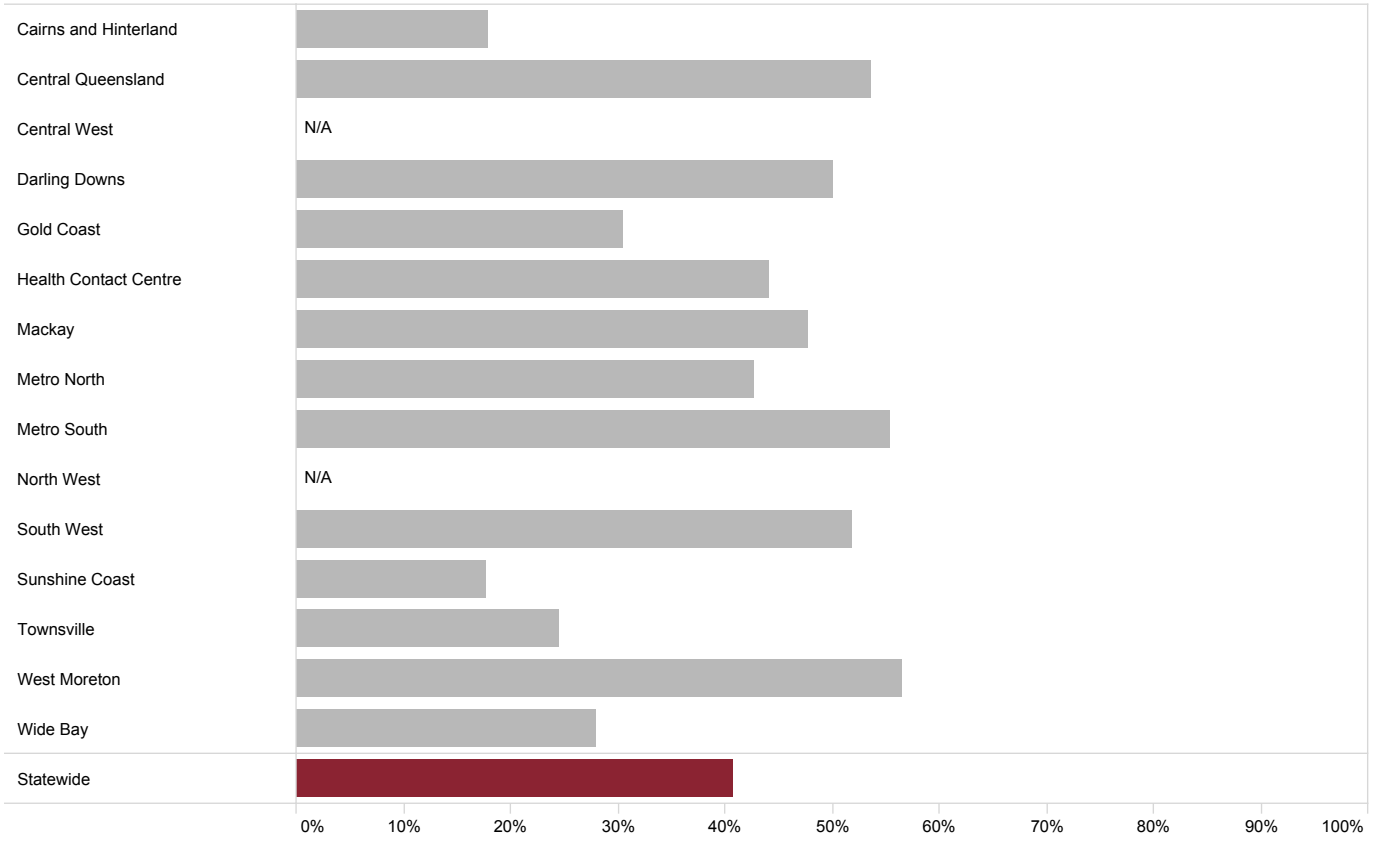
Completion rates and median time interval from pre assessment to post assessment varied considerably by HHS. The median time from pre assessment to post assessment was 80 days, with a range of 50 days to 259 days across outpatient HHS. There was considerable variation in the proportion of cases where a post assessment was completed, suggesting the model of care and data entry vary at a local level. A range of issues can contribute to completion of the post assessment which may include timing, patient availability or other factors outside the control of the program. Reasons for non-participation in the post assessment presents an opportunity for investigation in the future.

Data reported in this section uses a six month cut-off period for post assessment completion.

Table 6: Total post assessments completed by HHS

Outpatient HHS/division	Post assessment completed n (%)	Median time to post assessment days
Cairns and Hinterland	83 (17.8)	78
Central Queensland	362 (53.6)	76
Central West	1 (2.6)	N/A
Darling Downs	152 (50.2)	56
Gold Coast	307 (30.5)	50
Health Contact Centre	329 (44.1)	155
Mackay	74 (47.7)	83
Metro North	401 (42.7)	105
Metro South	709 (55.3)	66
North West	5 (10.2)	N/A
South West	27 (51.9)	98
Sunshine Coast	96 (17.6)	107
Townsville	56 (24.6)	259
West Moreton	267 (56.6)	74
Wide Bay	60 (28.0)	57
Statewide	**2,929 (40.8)**	**80**

N/A: Not displayed due to <20 post assessments for analysis



N/A: Not displayed due to <20 post assessments for analysis

Figure 7: Proportion of CR assessments proceeding to post assessment

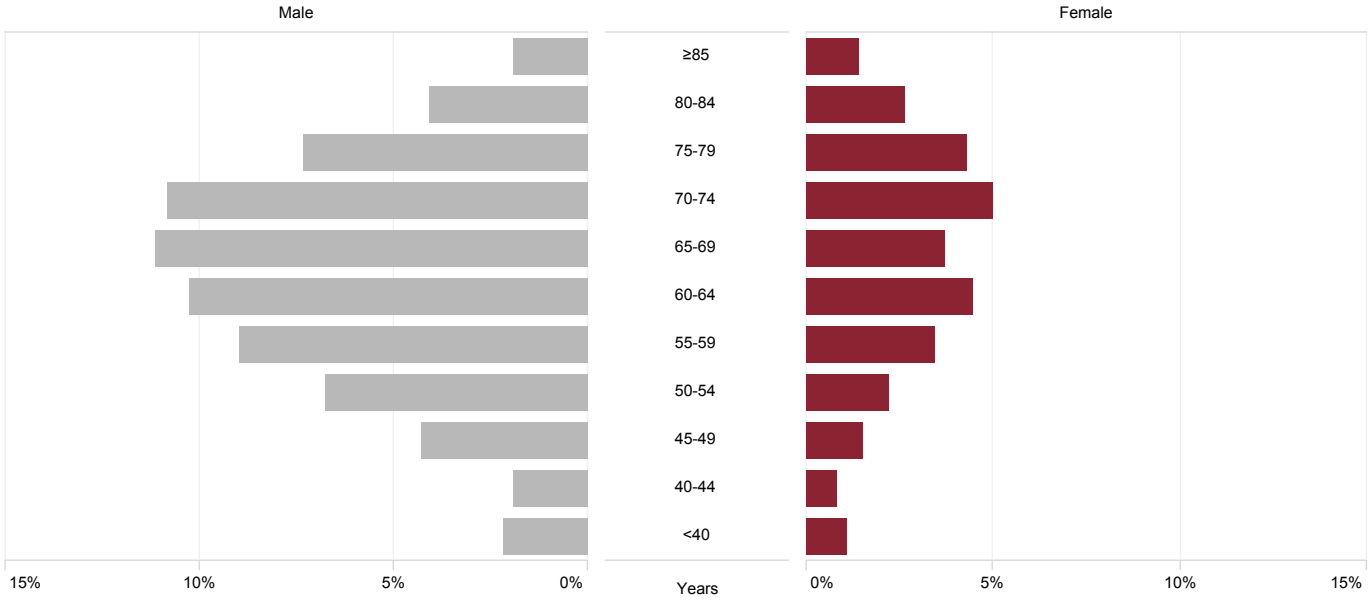
6 Patient characteristics

The following analysis examines the characteristics of the 7,175 patients who completed an initial CR pre assessment. Largely these characteristics are similar to those reported over previous years.

6.1 Age and gender

Development of cardiovascular disease is related to age. Overall, 70% of patients were male and 30% female. The age distribution of referrals was similar for genders, though the median age for males was slightly lower than for females (65 years vs. 68 years).

Overall, three quarters of patients were 57 years of age or older (interquartile range 57 years to 74 years).



% of total referrals (n=11,177)

Figure 8: Referrals by patient gender and age group

Table 7: Median patient age by gender and HHS

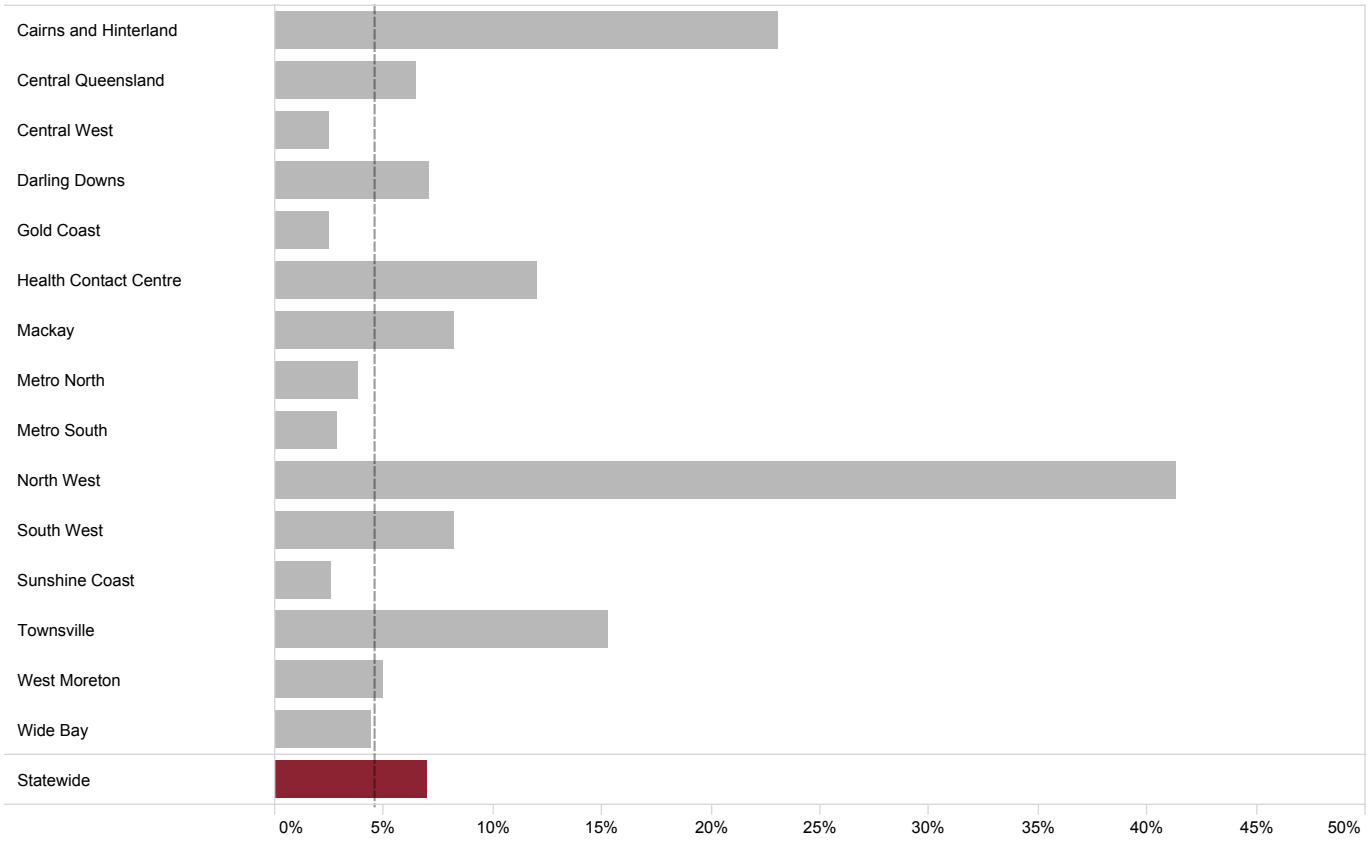
Outpatient HHS/division	Male years	Female years	All years
Cairns and Hinterland	65	63	64
Central Queensland	67	69	68
Central West	64	67	66
Darling Downs	65	64	65
Gold Coast	66	70	67
Health Contact Centre	64	67	65
Mackay	66	63	65
Metro North	67	69	67
Metro South	63	67	64
North West	53	59	55
South West	71	71	71
Sunshine Coast	66	69	67
Townsville	63	62	63
West Moreton	65	68	66
Wide Bay	68	69	68
Statewide	**65**	**68**	**66**

6.2 Aboriginal and Torres Strait Islander status

It is recognised that the Aboriginal and Torres Strait Islander population has a higher incidence and prevalence of coronary artery disease with ischaemic heart disease identified as the leading cause of death among Indigenous Australians in 2020.[31]

In this cohort, Aboriginal and Torres Strait Islander patients represent 7% of all statewide referrals with considerable variation observed across CR programs. By comparison, the estimated overall proportion of the Aboriginal and Torres Strait Islander population in Queensland is 4.6%.[2]

Larger proportions of Aboriginal and Torres Strait Islander patients were referred to CR programs in northern HHSs. Cairns and Hinterland, Townsville and North West HHSs all reported more than 12% of patients identifying as Aboriginal and Torres Strait Islander.

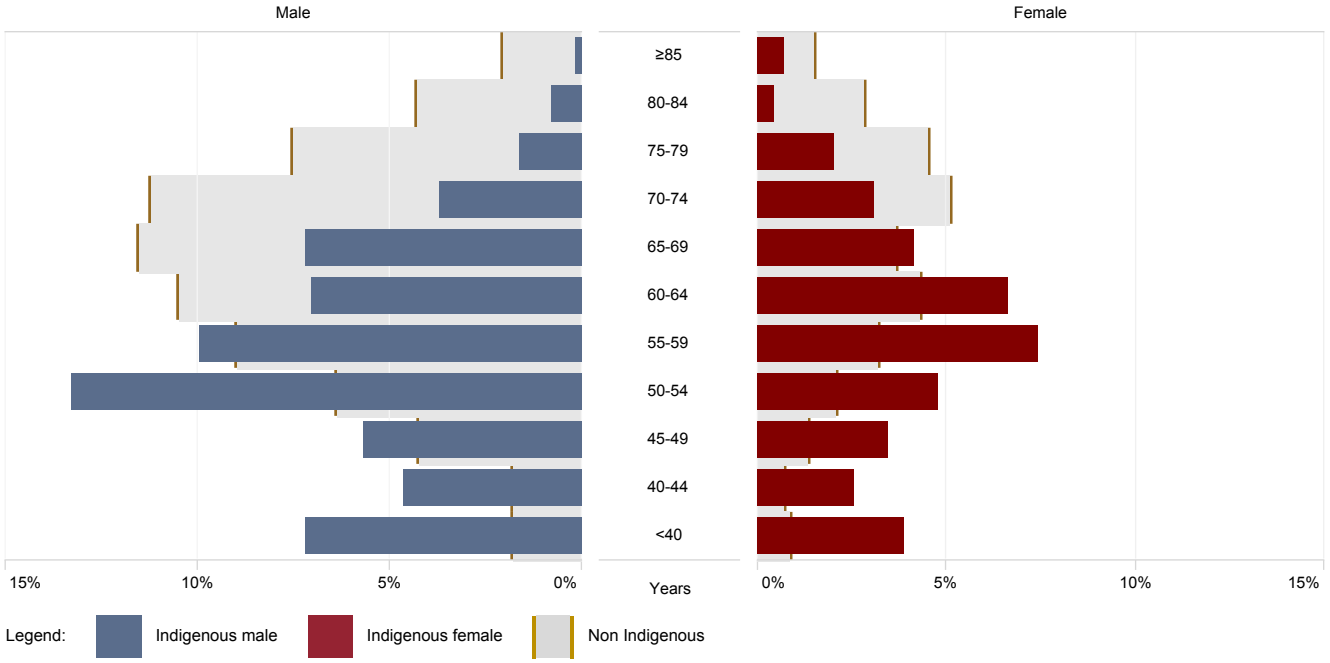


Excludes missing data (3.3%)

Figure 9: Proportion of identified Aboriginal and Torres Strait Islander patients by outpatient HHS

The proportion of Aboriginal and Torres Strait Islander patients referred to CR had a median age considerably lower than other patients (56 years vs. 66 years respectively).

The rate of cardiovascular disease among Aboriginal and Torres Strait Islander patients is largely different to that seen among other Australians. The disparity in median age and proportionate numbers of Aboriginal and Torres Strait Islander patients undertaking CR is consistent with chronic diseases occurring more often and at a younger age compared to non-Indigenous Australians.



Excludes missing data (3.3%)

Figure 10: Proportion of all CR referrals by age group and Indigenous status

Table 8: Median patient age by gender and Indigenous status

	Male years	Female years	All years
Aboriginal and Torres Strait Islander	55	58	56
Non Aboriginal and Torres Strait Islander	66	69	66
Total	**65**	**68**	**66**

Excludes missing data 3.3%

7 Clinical presentation

7.1 Diagnosis

For the following analysis, patients attending a CR pre assessment have been grouped into a diagnosis category based on clinical patient information obtained through the course of referral and pre assessment.

The majority of pre assessments (66%) followed a previous diagnosis of ischaemic heart disease (IHD).

Table 9: Pre assessments by diagnosis category

Diagnosis category	n	%
Ischaemic heart disease*	4,725	65.9
Valvular disease	626	8.7
Other†	1,824	25.4
ALL	**7,175**	**100.0**

* STEMI, NSTEMI and angina

† Typically includes arrhythmia, congestive heart failure and any other diagnosis

7.2 Most recent procedure

The most common procedure preceding a referral to CR was PCI. This was documented for 41% of all referrals and 56% of referrals for patients with IHD.

There were 12% of cases where the most recent procedure had not been identified. These cases can be attributed to missing data, or to patients being conservatively managed and thus having no previous invasive cardiac procedure at the time of program commencement.

Table 10: Most recent procedure noted at pre assessment by diagnosis category

Most recent procedure	Ischaemic heart disease n (%)	Valvular disease n (%)	Other n (%)	All n (%)
PCI	2,663 (56.4)	2 (0.3)	297 (16.3)	2,962 (41.3)
Coronary angiogram	723 (15.3)	12 (1.9)	345 (18.9)	1,080 (15.1)
CABG	814 (17.2)	9 (1.4)	325 (17.8)	1,148 (16.0)
Valve procedure	9 (0.2)	523 (83.5)	133 (7.3)	665 (9.3)
Device procedure	8 (0.2)	2 (0.3)	125 (6.9)	135 (1.9)
CABG + valve procedure	58 (1.2)	52 (8.3)	35 (1.9)	145 (2.0)
Other	40 (0.8)	8 (1.3)	160 (8.8)	208 (2.9)
Not specified	410 (8.7)	18 (2.9)	404 (22.1)	832 (11.6)

7.3 Risk factors and comorbidities

The following risk factors and comorbidities are discussed with the patient through the assessment phase and are generally self reported by the patient. With all self reporting instances, it is important to note that sometimes responses are not accurately conveyed while the patient and clinician are in the establishment phase of their relationship. As a result, some of the risk factor metrics may be understated.

At the time of the pre assessment:

- The majority of patients (90%) had a history of abnormal cholesterol levels or had been prescribed lipid lowering therapy at the time of assessment. This ranged from 64% to 97% across diagnosis categories.
- Only 39% of patients met the physical activity guidelines for their age and were sufficiently active. Furthermore, 18% of patients were classed as inactive, which is defined as only undertaking activities associated with daily living.
- The majority of patients were identified as having an unhealthy body mass index (BMI) with less than one quarter (20%) of patients having a BMI within the normal range.
- Overall, 28% of patients had diabetes as a comorbidity with some variation observed between diagnosis categories.
- Almost half (47%) of patients had a family history of cardiovascular disease.
- Overall, there were 16% of patients assessed by outpatient CR who were documented as having heart failure.
- Of the patients documented to have heart failure, 87% were classed as having a reduced ejection fraction (LVEF <50%).
- Over one quarter (28%) of patients had a documented history of depression.
- More than half of patients (60%) were identified as having a history of hypertension.
- There were 13% of patients identified as current smokers (defined as smoking within 30 days), while 50% were classed as former smokers.

Table 11: Summary of risk factors by diagnosis category

Risk factor	Ischaemic heart disease %	Valvular disease %	Other %	All %
Abnormal cholesterol*	97.0	64.2	82.1	90.3
Activity level				
Sufficiently active	39.9	39.9	35.5	38.8
Insufficiently active	42.6	42.8	44.4	43.1
Inactive	17.5	17.3	20.0	18.2
Body mass index				
Normal range†	19.7	23.7	19.9	20.1
Overweight‡	37.0	31.7	33.7	35.8
Obese§	36.3	38.3	36.6	36.6
Morbidly obese‖	6.3	4.6	8.3	6.7
Diabetes	28.5	19.7	27.8	27.6
Family history of CVD#	48.7	34.9	46.4	46.9
Heart failure	12.9	13.4	24.5	15.9
Heart failure, LVEF**				
≥50%	5.6	35.0	18.1	12.5
40–49%	44.4	30.0	27.0	36.8
30–39%	37.0	23.8	27.0	32.3
‹30%	13.0	11.3	27.8	18.4
History of depression	28.9	22.2	28.2	28.1
Hypertension	59.4	53.5	62.3	59.6
Smoking status				
Current smoker††	15.6	6.9	9.6	13.3
Former smoker	50.4	45.2	48.6	49.5
Never smoked	34.0	47.9	41.8	37.2

% from total complete data per case category

* Total cholesterol ›4.0 mmol/L, HDL ‹1.0 mmol/L, LDL ›2.0 mmol/L or triglycerides ›2.0 mmol/L

† BMI 18.5–24.9 kg/m²

‡ BMI 25.0–29.9 kg/m²

§ BMI 30.0–39.9 kg/m²

‖ BMI ≥40.0 kg/m²

\# Cardiovascular disease

** Left ventricular ejection fraction

†† Within 30 days

7.4 Current medications

Over three quarters of patients were being treated with aspirin (84%) and lipid lowering medications (85%). As expected, there was variation in medication across diagnosis categories. Patients with IHD tended to use antiplatelet and sublingual nitrate medications more than patients with valvular disease. This is consistent with the different disease processes and respective treatment regimes.

Table 12: Current medications by diagnosis category

Medications	IHD %	Valvular disease %	Other %	All %
Aspirin	92.2	64.4	67.9	83.6
ACEI/ARB*	65.4	41.7	54.3	60.5
Antiplatelet	70.5	11.4	31.1	55.3
Anticoagulant	14.8	47.9	28.2	21.1
Beta blocker	68.9	56.6	62.2	66.1
Diabetic medications	23.8	16.5	23.7	23.2
Dual antiplatelet	66.3	7.4	24.5	50.5
Lipid lowering	92.9	53.2	75.5	85.1
Sublingual nitrate	63.4	7.2	26.7	49.2
Other	67.0	84.6	74.9	70.5

* Angiotensin converting enzyme inhibitor/angiotensin receptor blocker

8 Program outcomes

The following outcome measures use paired observations from the pre assessment and post assessment stages to identify changes in health status for patients participating in CR. Measures included in this analysis relate to patient reported outcome measures (PROMS) and other functional or pathological investigations.

A limiting factor for this analysis is availability of data for the post assessment stage. Specifically, the availability of updated pathology and other investigations as well as the model of care employed by the CR program. This may result in limited data from which conclusions can be drawn and is a focus for future reporting and enhancements to data collection.

Table 13: Summary of program outcome measures

Program outcome	Category	Measure
1	Pathology	Lipid profile
2	Functional	Six minute walk test
3	PROMS	Patient Health Questionnaire
4	PROMS	Assessment of Quality of Life
5	PROMS	Other patient reported outcomes

8.1 Lipid profile

Data for lipid values such as total cholesterol was available for a smaller proportion of patients completing CR. A barrier to reporting this outcome is that updated pathology results are not always available for the post assessment stage. It is hoped that this limitation may be reduced with increased availability of data and linkage with other Queensland Health data collections.

Overall a reduction in the mean total cholesterol was observed as was a reduction in triglycerides and LDL-C levels. This may be attributable to the impact of CR and adherence with pharmacotherapy.

Table 14: Summary of lipid values

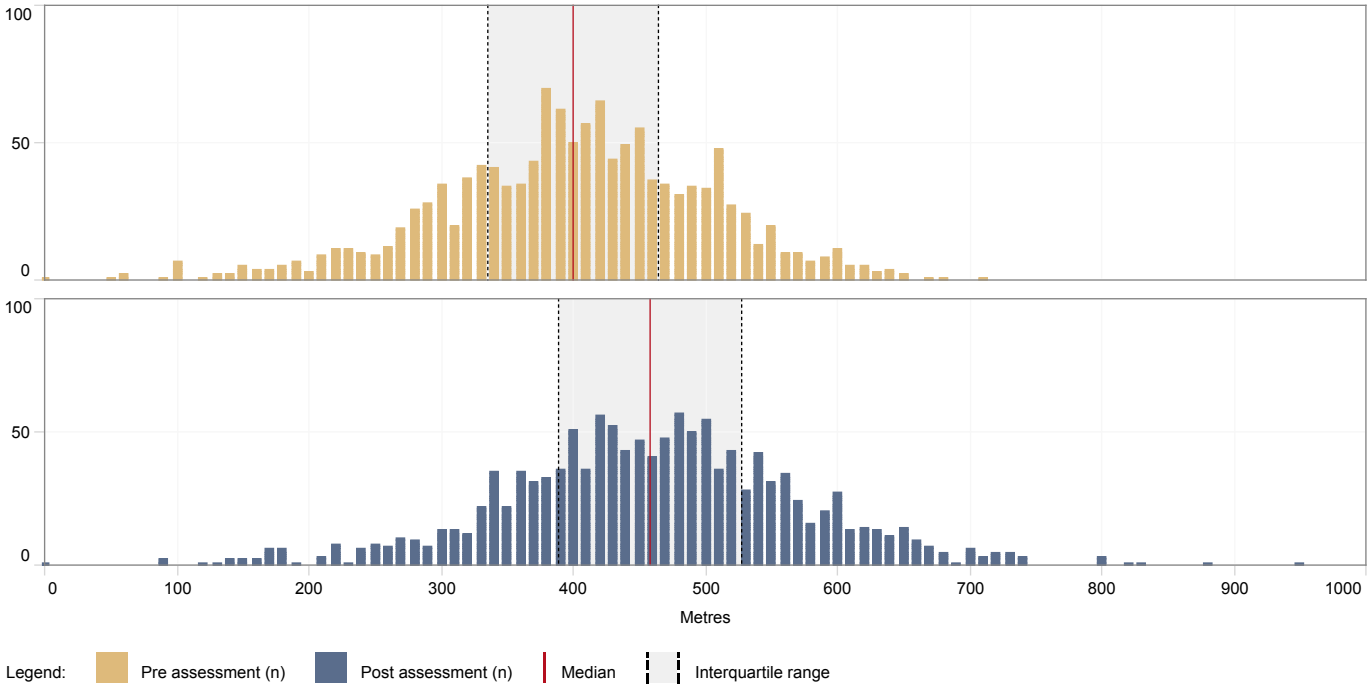
	Total analysed n	Pre assessment Mean ± SD	Post assessment Mean ± SD	Change in value Mean ± SD
Total cholesterol (mmol/L)	392	4.8 ± 1.4	3.7 ± 0.9	-1.1 ± 1.4
Triglycerides (mmol/L)	358	1.9 ± 1.6	1.5 ± 1.1	-0.4 ± 1.3
HDL-C (mmol/L)	315	1.1 ± 0.3	1.1 ± 0.4	0.0 ± 0.3
LDL-C (mmol/L)	310	2.9 ± 1.2	1.8 ± 0.8	-1.1 ± 1.2

8.2 Six minute walk test

A functional measure is commonly utilised prior to implementing an exercise program in order to determine exercise prescription and enable changes to be measured. The six minute walk test (6MWT) is a standardised investigation of submaximal exercise capacity that is often used in patients with cardiopulmonary disease. Changes in the six minute walk distance are useful in assessing functional capacity and the efficacy of therapeutic interventions such as pharmacotherapy and CR.[32]

There were 1,288 cases where the patient completed a 6MWT at the pre assessment and post assessment stages. The 6MWT is not always feasible due to the different models of care that exist, with some programs not offering an exercise component. In the majority of instances (72%) patients demonstrated an improvement in 6MWT, with 53% recording an increase of greater than 50 metres (Table 16).

Throughout 2020, there was a 39% reduction in the data available for 6MWT outcomes. It is likely this is attributable to the interruption of CR gym programs due to the global COVID-19 pandemic.



Results rounded to 10 metres

Figure 11: Comparison of pre assessment and post assessment six minute walk test results

Table 15: Summary of six minute walk test results

	Total analysed n	Pre assessment Mean ± SD	Post assessment Mean ± SD	Change in value Mean ± SD
Distance travelled (metres)	1,288	397.3 ± 101.4	456.7 ± 112.9	59.5 ± 62.0

Table 16: Change in six minute walk test results

	n (%)
Improved ≥50 metres	680 (52.8)
Improved 26–49 metres	243 (18.9)
No change (≤25 metres)	306 (23.8)
Worsened >25 metres	59 (4.6)
ALL	**1,288 (100.0)**

8.3 Patient reported outcome measures

Patient Health Questionnaire

The CR assessment often includes a brief screening for anxiety and depressive disorders. Both of these are significant risk factors for patients suffering coronary artery disease and are associated with adverse cardiovascular outcomes independent of other risk factors.

The Patient Health Questionnaire-4 (PHQ-4) is a validated tool for screening anxiety and depressive disorders.[33] This instrument is a four item composite measure derived from the Generalized Anxiety Disorder-7 scale (GAD-7) and the Patient Health Questionnaire-9 (PHQ-9). Each of the four items on the PHQ-4 is scored using a four point scale:

- high psychological distress being scored 9–12 points
- mild psychological distress scoring between 3–5 points
- minimal depression and anxiety scoring between 0–2 points.

A total of 2,584 paired data were available for analysis. Over one quarter of patients (28%) demonstrated an improved PHQ-4 score at post assessment and 57% recorded no change to their PHQ-4 score. Given a large proportion of patients reported minimal depression and anxiety at the pre assessment there is often no scope for improvement via this metric.

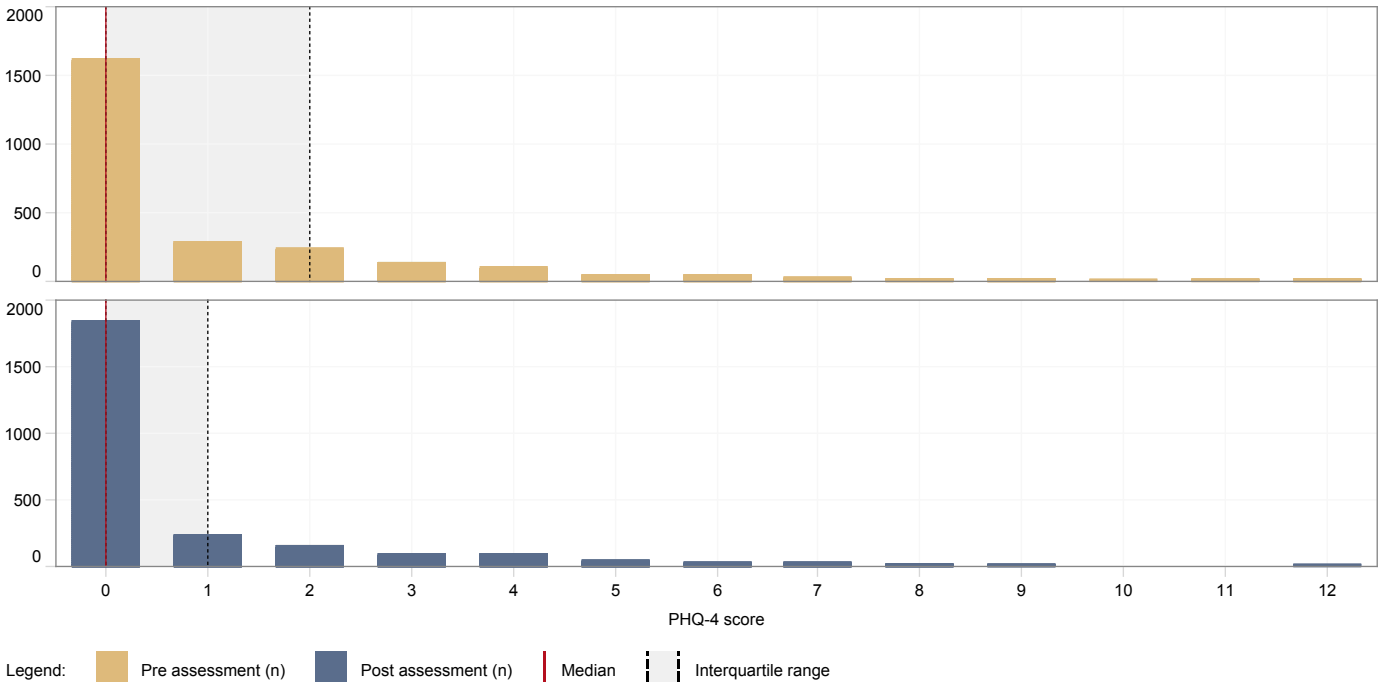


Figure 12: Comparison of pre assessment and post assessment PHQ-4 results

Table 17: Summary of PHQ-4 results

	Total analysed n	Pre assessment Mean ± SD	Post assessment Mean ± SD	Change in value Mean ± SD
Depression score (PHQ-2)	2,584	0.5 ± 1.2	0.4 ± 1.0	-0.1 ± 1.2
Anxiety score (GAD-2)	2,584	0.7 ± 1.3	0.5 ± 1.1	-0.2 ± 1.2
Overall score	**2,584**	**1.2 ± 2.2**	**0.9 ± 1.9**	**-0.3 ± 2.1**

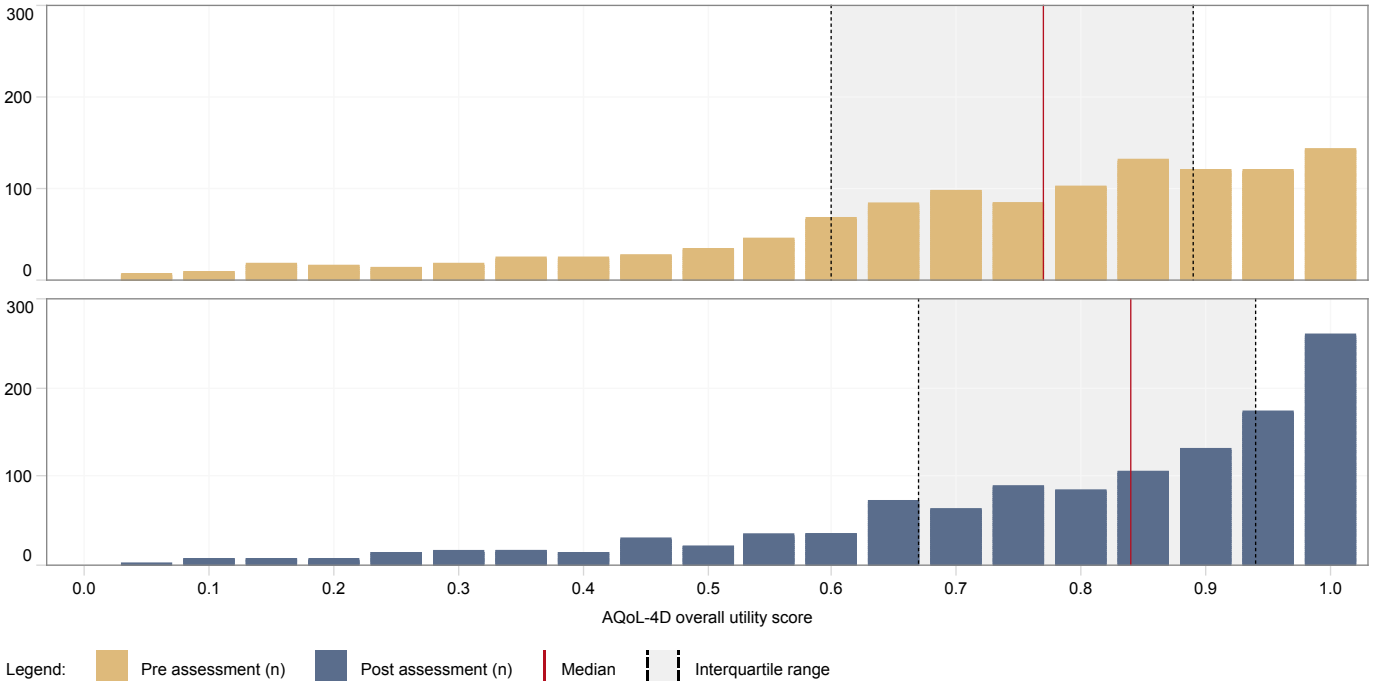
Table 18: Change in PHQ-4 results

	n (%)
Any improvement	717 (27.7)
No change	1,467 (56.8)
Any worse result	400 (15.5)
ALL	**2,584 (100.0)**

Assessment of Quality of Life

The Assessment of Quality of Life (AQoL-4D) is a multi-attribute utility instrument developed to assess health related quality of life. It measures PROMS across four domains of health, scored individually, as well as providing an overall score. Overall AQoL-4D utility score ranges from 0.00–1.00, with scores closer to 1.00 indicating higher satisfaction of patients reporting the status of their own health.

For the 1,192 records available at the pre and post CR timeframes, the mean overall pre assessment AQoL-4D utility score was 0.72 which compares similarly to expected results for patients with a cardiovascular diagnosis.[34] This utility score improved to 0.78 at the post assessment stage, where 60% of patients demonstrated an improved overall utility score after CR intervention (Table 19 and Table 20).



Results rounded to 0.05 utility score

Figure 13: Comparison of pre assessment and post assessment AQoL-4D results

Table 19: Summary of AQoL-4D results

	Total analysed n	Pre assessment Mean ± SD	Post assessment Mean ± SD	Change in value Mean ± SD
Independent living	1,192	0.90 ± 0.16	0.95 ± 0.12	0.04 ± 0.14
Relationships	1,192	0.91 ± 0.15	0.92 ± 0.15	0.01 ± 0.15
Senses	1,192	0.94 ± 0.08	0.94 ± 0.08	0.01 ± 0.08
Mental health	1,192	0.89 ± 0.12	0.91 ± 0.11	0.02 ± 0.11
Overall score	**1,192**	**0.72 ± 0.23**	**0.78 ± 0.22**	**0.06 ± 0.20**

Table 20: Change in AQoL-4D results

	n (%)
Any improvement	713 (59.8)
No change	142 (11.9)
Any worse result	337 (28.3)
ALL	**1,192 (100.0)**

Other patient reported outcomes

Any assessment by a CR clinician includes a component assessing for quality of life (QOL). However, the use of a long-form questionnaire (such as AQoL-4D) is often impractical or unwarranted. The assessment of patient reported QOL takes the form of an abbreviated questionnaire allowing patients to self-report their health-related status across three domains.

The questions asked include:

- In general, how would you describe your health at present?
- In general, how would you describe your mood at present?
- How fit are you now compared with 6 months ago?

The abbreviated questionnaire often provides a gauge to whether the CR practitioner may need to apply a more detailed QOL assessment to better understand the status and needs of the individual patient.

Paired data on the condensed QOL survey were available for 1,368 assessments.

Self reported health

There were 44% of patients reporting a health status of very good or excellent at post assessment, compared with 17% at the pre assessment phase. Overall, half of patients (51%) reported a feeling of improved health. Reductions in the numbers of patients reporting fair or poor health were observed with only 2% of patients reporting poor health at post assessment.

Decreases in self reported health status were reported by 11% of patients, however caution should be exercised when interpreting this result as there are many confounding factors which may affect the health status of a patient with what is often a newly diagnosed complex chronic disease.

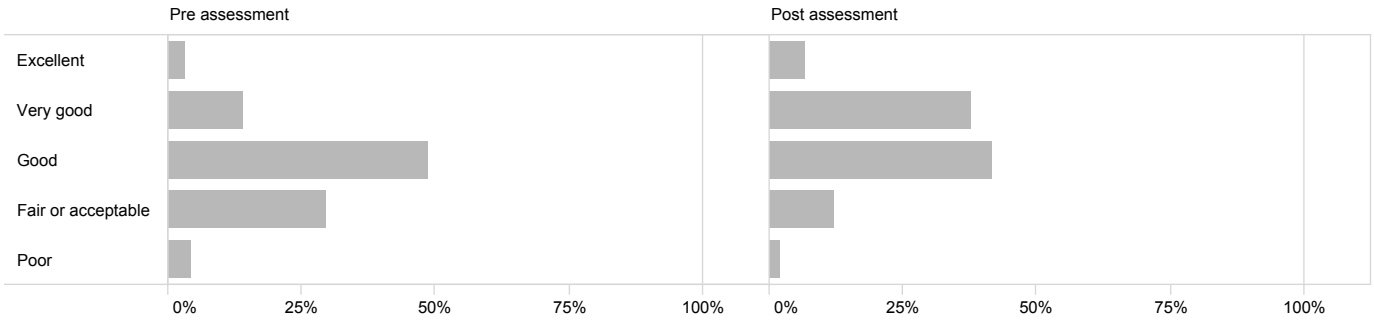


Figure 14: Comparison of patient reported health status at pre and post assessment

Table 21: Change in patient reported health status at pre and post assessment

	n (%)
Any improvement	694 (50.7)
No change	528 (38.6)
Any worse result	146 (10.7)
ALL	**1,368 (100.0)**

Self reported mood

Almost half of patients (45%) reported an improved mood compared to the pre assessment stage. The proportion of patients reporting excellent mood scores at post assessment increased from 4% to 10%, while those with very good mood scores increased from 19% to 36%.

There were 12% of patients who reported a decrease in mood, however it is reassuring to note an overall decrease in the proportion of patients reporting fair or poor mood.

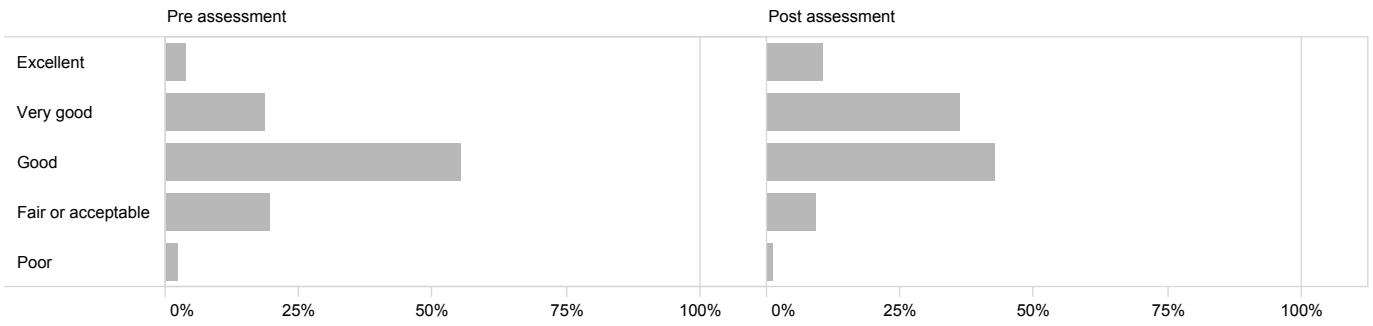


Figure 15: Comparison of patient reported mood at pre and post assessment

Table 22: Change in patient reported mood at pre and post assessment

	n (%)
Any improvement	610 (44.6)
No change	593 (43.3)
Any worse result	165 (12.1)
ALL	**1,368 (100.0)**

Self reported fitness

When asked to compare fitness level to the period six months prior to completing a CR program, over 46% of patients reported that their fitness had improved. Decreases in fitness were reported by 21% of patients. This finding may warrant further investigation as there may be various factors contributing to their reported decrease in fitness level.

Issues such as the development of significant cardiac dysfunction as a result of myocardial infarction may explain a decline in fitness. Given the result is compared to a baseline six months prior to completing CR, the patient's index cardiac event may also have occurred in this time and therefore regression may not be unexpected.

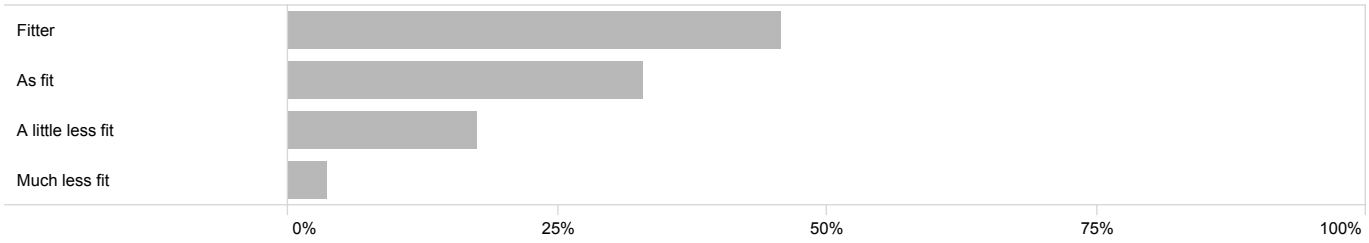


Figure 16: Patient reported change in fitness at post assessment

Table 23: Patient reported change in fitness at post assessment

	n (%)
Fitter	626 (45.8)
As fit	451 (32.9)
A little less fit	241 (17.6)
Much less fit	50 (3.7)
ALL	**1,368 (100.0)**

8.4 Failure to participate

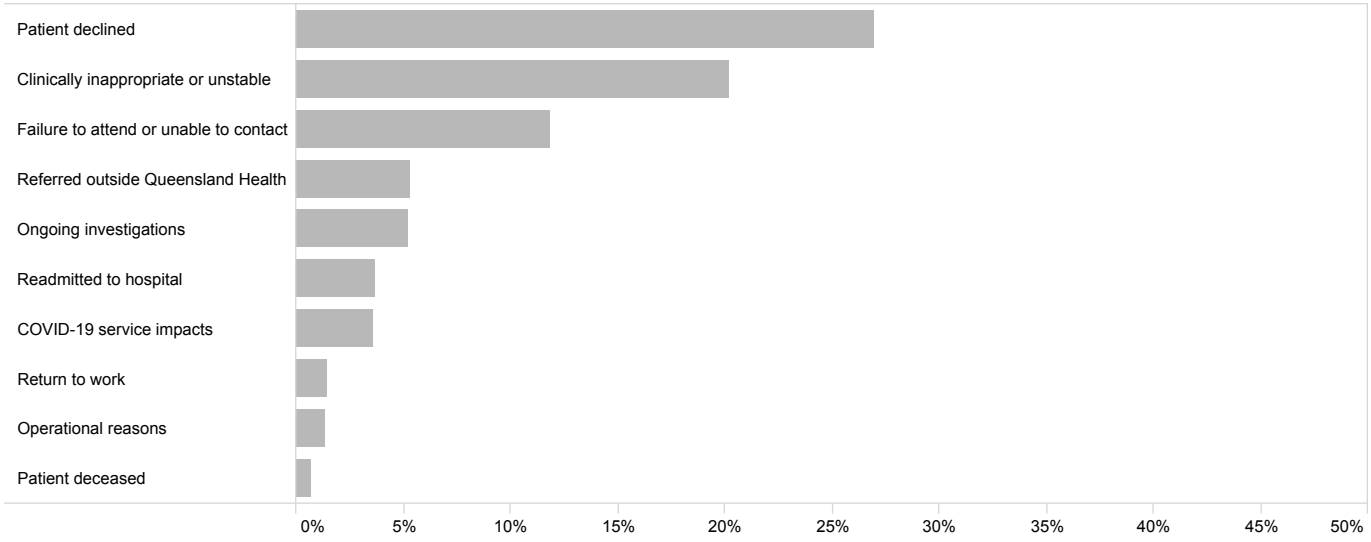
There are many reasons a patient may not participate in a CR program. In this cohort, which includes patients who declined or were unsuitable during phase 1 and phase 2, the most common reason for not participating in a CR program was that the patient had declined (27%). Twenty percent were medically inappropriate to participate or had been uncontactable or failed to attend (12%).

For 2020 referrals, 3.6% were declined due to impacts of the global COVID-19 pandemic such as compulsory service closures, staff redeployment and patient unwillingness to proceed.

An ongoing initiative has been to further define the subset of patients who did not participate in CR. The aim is to increase the level of detail available to describe the barriers to participation, identify common themes and opportunities to improve patient participation rates.

In some of these instances, the clinician may still provide opportunistic education and advice to these patients, however this is difficult to incorporate into reporting.

A limiting factor for this analysis is the amount of data available to describe this cohort, as this is limited to the information included on the initial referral only.



Not displaying other reasons (20%)

Figure 17: Reasons for no pre assessment being conducted

8.4.1 Age and gender

There is considerable variation in patient age when comparing patients who participated in CR as opposed to patients who declined or were not interested and patients who were medically unsuitable. Patients who participated in CR had a median age of 65 years, whilst patients who declined or were medically unsuitable had a median age four years older.

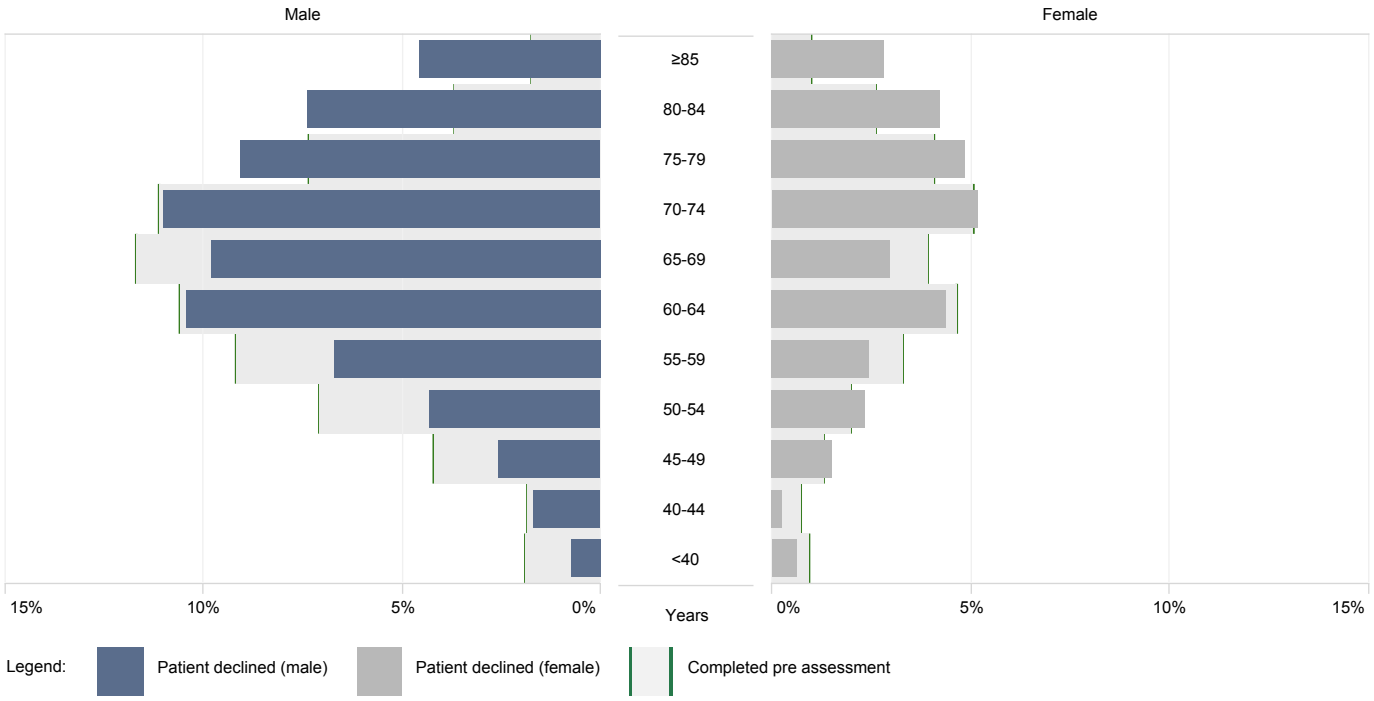


Figure 18: Patient age group and gender, patient declined vs. completed pre assessment

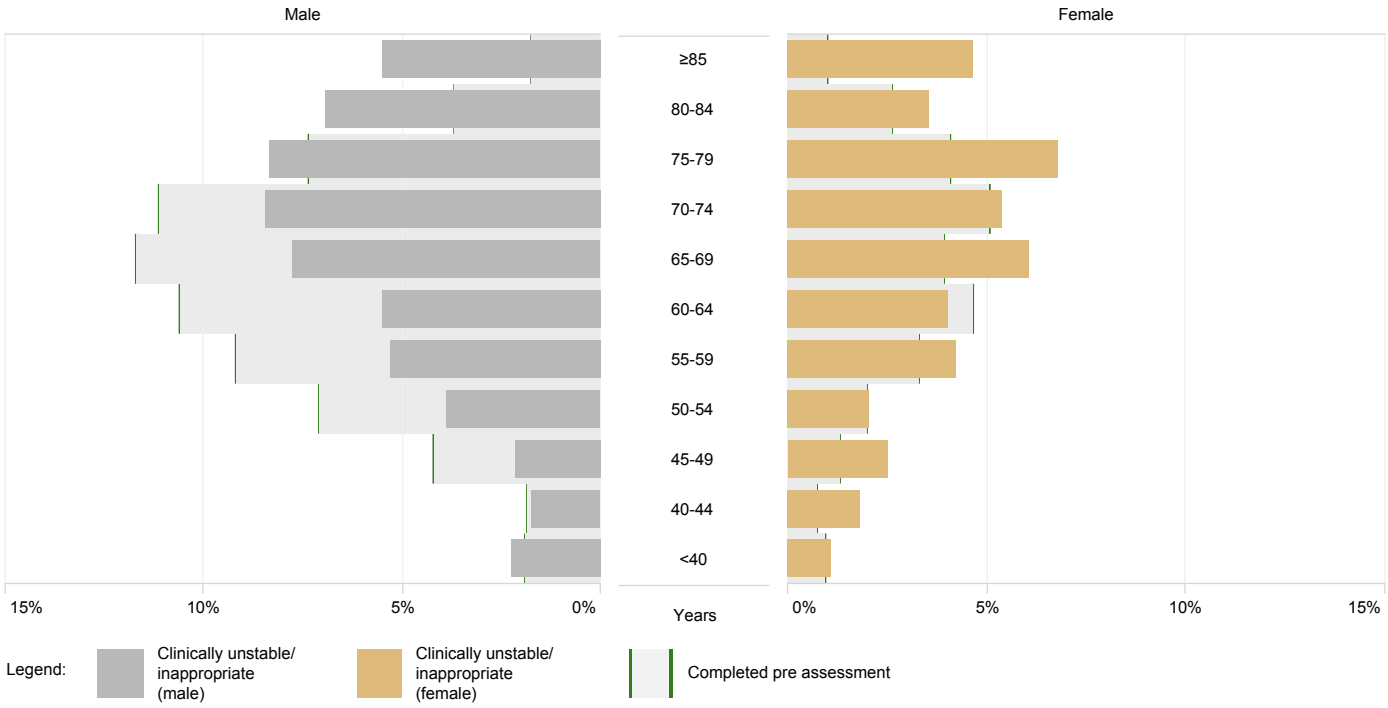


Figure 19: Patient age group and gender, clinically unstable/inappropriate vs. completed pre assessment

Table 24: Patient age (years) by program participation status

	Male Median (IQR)	Female Median (IQR)	ALL Median (IQR)
Pre assessment completed	65 (56–72)	67 (58–75)	65 (57–73)
Patient declined	69 (60–76)	71 (60–78)	69 (60–77)
Clinically unstable or inappropriate	70 (59–78)	69 (58–78)	69 (58–78)
Other reason not assessed	64 (55–73)	66 (57–77)	65 (55–74)

Table 25: Patient gender by program participation status

Gender	Pre assessment completed n (%)	Patient declined n (%)	Clinically unstable or inappropriate n (%)	Other reason not assessed n (%)
Female	2,127 (59.6)	391 (11.0)	390 (10.9)	662 (18.5)
Male	5,048 (63.6)	843 (10.6)	535 (6.7)	1,511 (19.0)
ALL	**7,175 (62.4)**	**1,234 (10.7)**	**925 (8.0)**	**2,173 (18.9)**

8.4.2 Diagnosis category

Of the patients who declined, 41% had a diagnosis of ischaemic heart disease and 4% had valvular disease. The majority (55%) had an other diagnosis.

By comparison, patients who had completed an initial assessment via CR were more likely to have a diagnosis of ischaemic heart disease or valvular heart disease (66% and 9% respectively).

Patients with no IHD or valvular disease were unlikely to commence a CR program, with 58% of these referrals declined by either the patient or the service. This may provide opportunities for services to review program offerings for these patients.

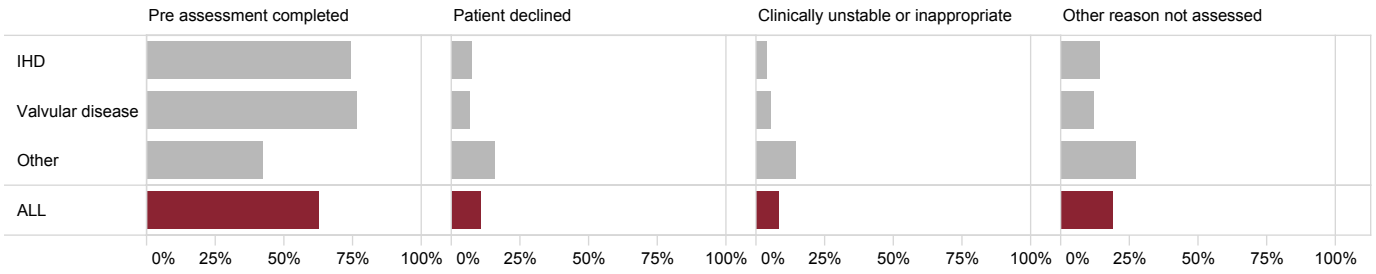


Figure 20: Proportion of cases by diagnosis category and program participation status

Table 26: Diagnosis category by program participation status

Gender	Pre assessment completed n (%)	Patient declined n (%)	Clinically unstable or inappropriate n (%)	Other reason not assessed n (%)
IHD	4,725 (74.1)	497 (7.8)	255 (4.0)	898 (14.1)
Valvular disease	626 (76.4)	54 (6.6)	43 (5.3)	96 (11.7)
Other	1,824 (42.3)	682 (15.8)	627 (14.5)	1,179 (27.3)
ALL	**7,175 (62.4)**	**1,233 (10.7)**	**925 (8.0)**	**2,173 (18.9)**

8.4.3 Most recent procedure

For the cohort that proceeded to assessment, their most recent procedure was closely related to their participation status. Eighty percent of patients who had a PCI procedure and 86% of patients who underwent CABG completed a pre assessment. This suggests that patients who have undergone an invasive cardiac procedure are more likely to have participated in a CR program.

Almost half of patients (47%) who declined CR had no recent procedure specified. Furthermore, 22% of patients that elected not to participate in CR were recorded as having undergone PCI, while approximately 8% had undergone CABG (with or without a concomitant valve procedure).

Care should be taken when interpreting these findings as this data element is not always completed at the time of referral. Therefore, it may not fully reflect the patient's medical history.

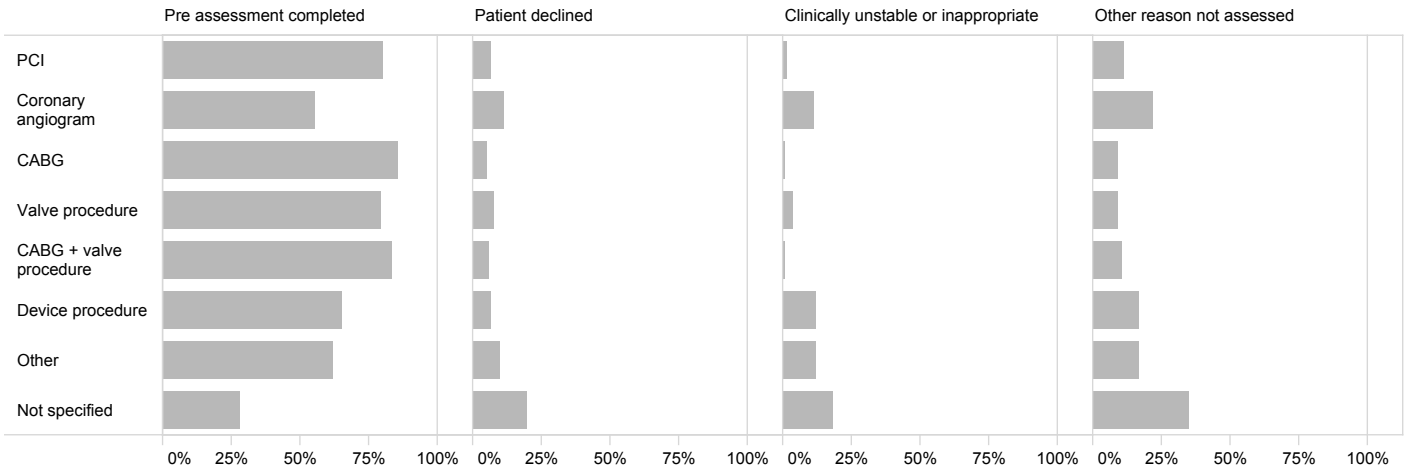


Figure 21: Proportion of referrals by most recent procedure and program participation status

Table 27: Most recent procedure by program participation status

Most recent procedure	Pre assessment completed n (%)	Patient declined n (%)	Clinically unstable or inappropriate n (%)	Other reason not assessed n (%)
PCI	2,962 (80.3)	254 (6.9)	51 (1.4)	420 (11.4)
Coronary angiogram	1,080 (55.4)	214 (11.0)	224 (11.5)	431 (22.1)
CABG	1,148 (85.5)	66 (4.9)	11 (0.8)	118 (8.8)
Valve procedure	665 (79.5)	66 (7.9)	30 (3.6)	76 (9.1)
CABG + valve procedure	145 (82.9)	11 (6.3)	1 (0.6)	18 (10.3)
Device procedure	135 (64.6)	14 (6.7)	26 (12.4)	34 (16.3)
Other	208 (61.7)	32 (9.5)	41 (12.2)	56 (16.6)
Not specified	832 (28.0)	576 (19.4)	541 (18.2)	1,020 (34.4)
ALL	**7,175 (62.4)**	**1,233 (10.7)**	**925 (8.0)**	**2,173 (18.9)**

8.4.4 Place of residence

Compared to patients who had taken up CR, a higher proportion of patients who elected not to participate resided in regional and remote areas of Queensland.

While there are many reasons a patient may wish not to participate in CR, this trend toward lower participation rates for patients in regional areas should be noted for service planning and model of care selection. These figures should be interpreted with caution due to the small numbers residing in the remote areas.

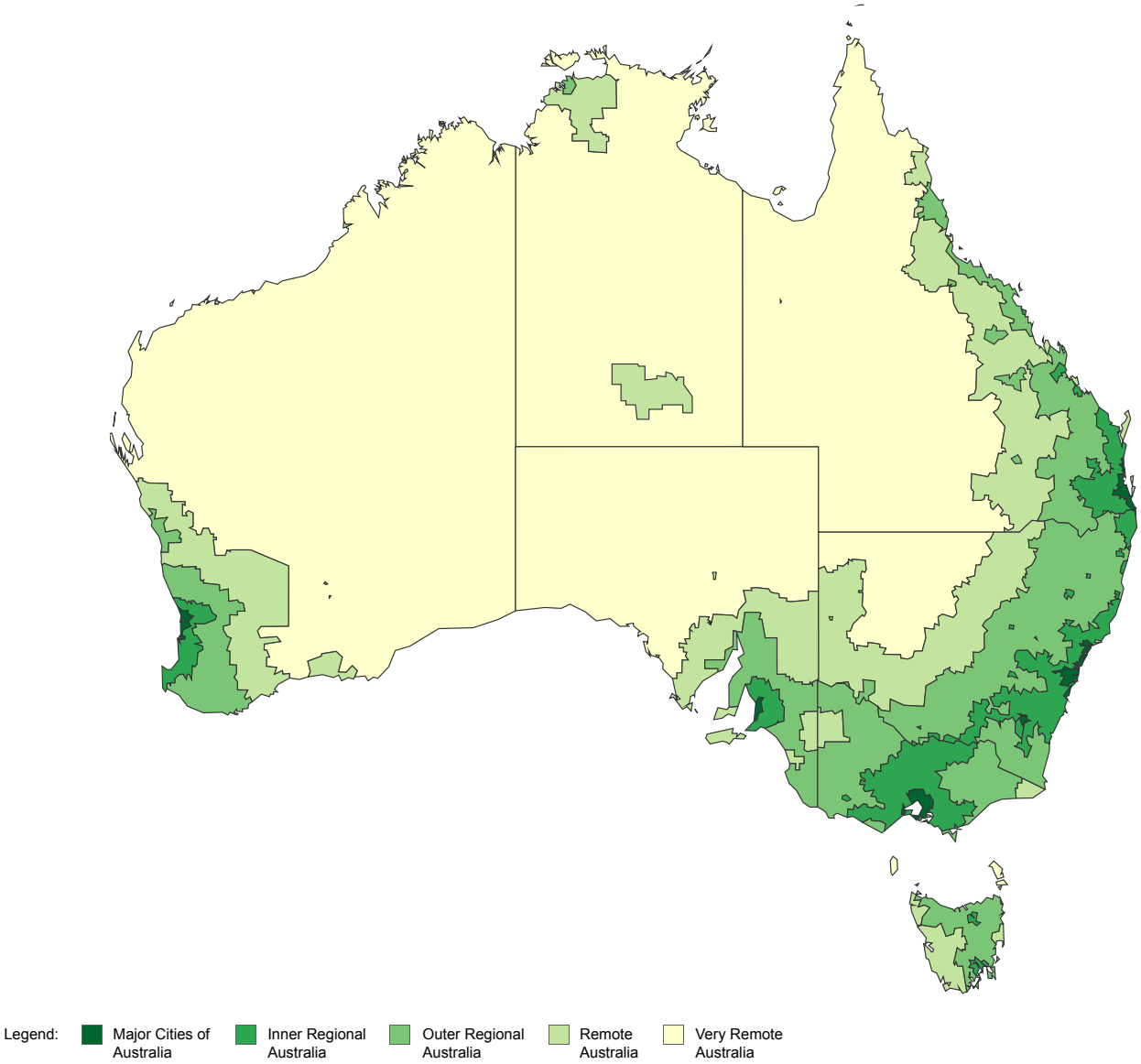


Figure 22: Australian Statistical Geography Standard remoteness areas

Table 28: Remoteness classification by program participation status

Remoteness area*	Pre assessment completed n (%)	Patient declined n (%)	Clinically unstable or inappropriate n (%)	Other reason not assessed n (%)
Major cities	3,936 (66.6)	592 (10.0)	384 (6.5)	994 (16.8)
Inner regional	1,872 (62.4)	351 (11.7)	168 (5.6)	611 (20.4)
Outer regional	1,094 (52.6)	249 (12.0)	302 (14.5)	436 (21.0)
Remote	67 (38.7)	23 (13.3)	39 (22.5)	44 (25.4)
Very remote	171 (62.4)	9 (3.3)	26 (9.5)	68 (24.8)
ALL	**7,140 (62.4)**	**1,224 (10.7)**	**919 (8.0)**	**2,153 (18.8)**

Excludes missing data (0.6%)

* Classified by Australian Statistical Geography Standard remoteness area

9 Clinical indicators

The CR clinical indicator program has been focused towards the timely provision of CR to admitted patients discharged from public hospitals. This requires collaboration between the acute and outpatient services, with each having their own targets (clinical indicators 1 and 2a respectively).

Overall system performance is measured through clinical indicator 3, which requires the acute and outpatient services to both meet their respective targets. For the purpose of this indicator any referrals crossing between HHSs are counted under both the referring and receiving HHS/organisation.

Table 29: Cardiac rehabilitation clinical indicators

#	Clinical indicator	Description
1	Timely referral – inpatients	Documented referral to CR within three days of discharge
2a	Timely assessment – inpatients	Initial CR pre assessment completed within 28 days of discharge
2b	Timely assessment – non acute patients	Initial CR pre assessment completed within 28 days of referral date
3	Timely journey – inpatients	Composite of timely referral and assessment

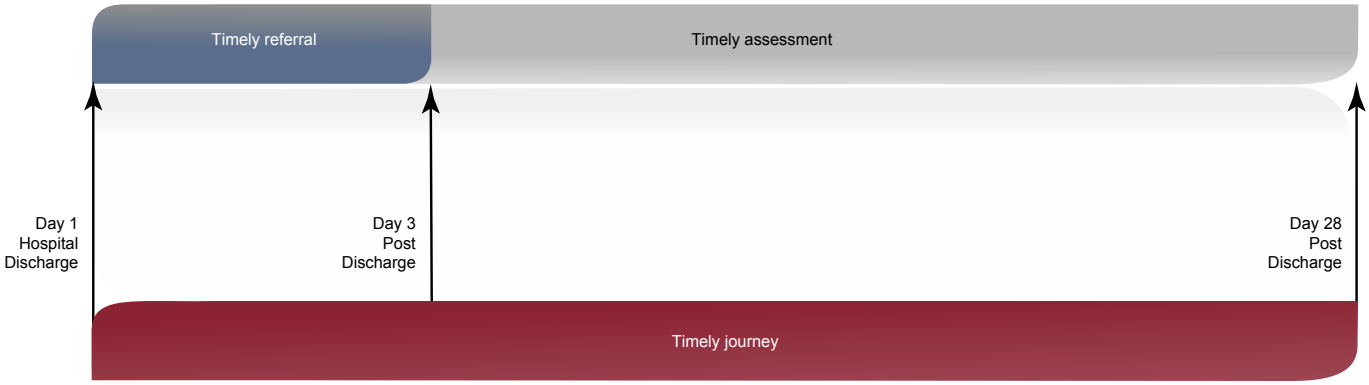


Figure 23: Timely referral, assessment and overall journey for inpatient referrals

9.1 Timely referral

This indicator examines the proportion of inpatient referrals to CR originating from a public hospital which had been provided to the CR program in a timely manner (within 3 days of referral). This requires the referral to be submitted to the outpatient program within three days of the patient being discharged from hospital.

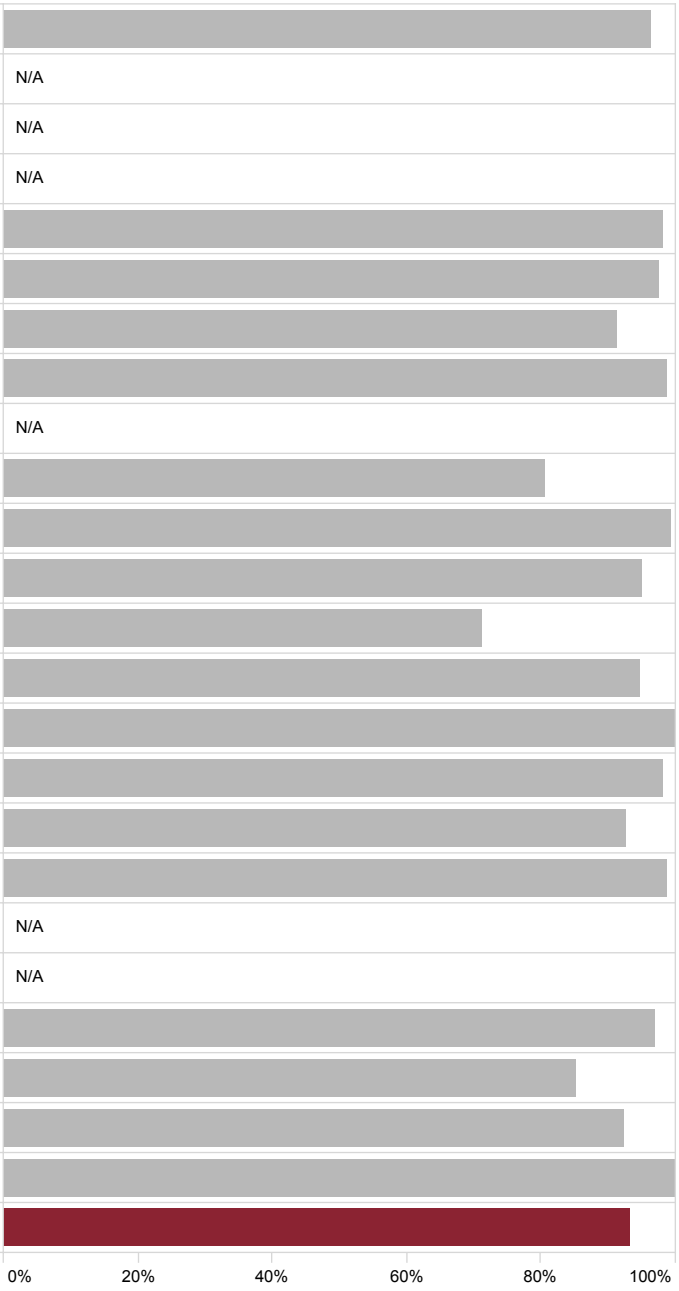
Overall, performance is high with 93% of referrals contributed to QCOR being submitted within three days of discharge.

Table 30: Timely referrals by referring HHS

Referring HHS/organisation	Total inpatient referrals n	Total eligible for analysis n	Target met n (%)
Cairns and Hinterland	705	697	671 (96.3)
Central Queensland	381	338	328 (97.0)
Darling Downs	131	128	125 (97.7)
Gold Coast	1,345	1,316	1,201 (91.3)
Mackay	92	92	91 (98.9)
Mater Health Services	95	87	70 (80.5)
Metro North	2,093	2,077	1,878 (90.4)
Metro South	1,775	1,772	1,738 (98.1)
South West	1	1	N/A
Sunshine Coast	787	753	730 (96.9)
Townsville	791	780	664 (85.1)
West Moreton	134	131	121 (92.4)
Wide Bay	67	67	67 (100.0)
Statewide	**8,397**	**8,239**	**7,685 (93.3)**

N/A: Not displayed due to <20 referrals eligible for analysis

Referring HHS	Referred by hospital	Total analysed, n
Cairns and Hinterland	Cairns Hospital	696
	Mossman Hospital	1
Central Queensland	Gladstone Hospital	12
	Mount Morgan Hospital	1
	Rockhampton Hospital	325
Darling Downs	Toowoomba Hospital	128
Gold Coast	Gold Cost University Hospital	1,316
Mackay	Mackay Base Hospital	91
	Proserpine Hospital	1
Mater Health Services	Mater Hospital Brisbane	87
Metro North	Caboolture Hospital	137
	Redcliffe Hospital	40
	Royal Brisbane & Women's Hospital	416
	The Prince Charles Hospital	1,484
Metro South	Logan Hospital	83
	Princess Alexandra Hospital	1,547
	Queen Elizabeth II Jubilee Hospital	66
	Redland Hospital	76
South West	Charleville Hospital	1
Sunshine Coast	Nambour General Hospital	1
	Sunshine Coast University Hospital	752
Townsville	Townsville University Hospital	780
West Moreton	Ipswich Hospital	131
Wide Bay	Bundaberg Base Hospital	67
Statewide		



N/A: Not displayed due to <20 referrals eligible for analysis

Figure 24: Timely referrals by referring hospital

9.2 Timely assessment – inpatients

This indicator examines the proportion of referrals to CR which proceed to an assessment within 28 days of discharge. In order to retain focus on the performance of the outpatient CR program, referrals which are not provided in a timely manner (<3 days from discharge) have been excluded from the analysis. Further to this, other ineligibility criteria are outlined in Table 31. The exclusions are applied where information is available and has been documented in the application.

Overall, more than half of all patients (62%) are being assessed in a timely manner, however there was some variation across health services.

Table 31: Summary of referrals ineligible for timely assessment clinical indicator – inpatients

Summary	n
Not referred within 3 days of discharge	519
Referred outside of Queensland Health	185
Clinically unstable/inappropriate	162
Same day admission	155
Patient readmitted to hospital	148
Patient accepted onto existing program	58
Patient deceased	29
ALL	**1,256**

Table 32: Timely assessment indicator by outpatient HHS – inpatients

Outpatient HHS/division	Total inpatient referrals n	Total eligible for analysis n	Target met n (%)
Cairns and Hinterland	686	568	358 (63.0)
Central Queensland	612	494	251 (50.8)
Central West	21	20	15 (75.0)
Darling Downs	346	326	109 (33.4)
Gold Coast	1,329	1,027	731 (71.2)
Health Contact Centre	1,042	816	501 (61.4)
Mackay	175	169	27 (16.0)
Metro North	1,008	889	536 (60.3)
Metro South	1,256	1,174	901 (76.7)
North West	44	31	24 (77.4)
South West	28	27	12 (44.4)
Sunshine Coast	860	728	450 (61.8)
Townsville	379	313	148 (47.3)
West Moreton	370	349	248 (71.1)
Wide Bay	241	210	116 (55.2)
Statewide	**8,397**	**7,141**	**4,427 (62.0)**

Outpatient HHS/division	Outpatient program	Total analysed, n
Cairns and Hinterland	Atherton	59
	Cairns	479
	Innisfail	58
	Mareeba	31
	Tully	34
Central Queensland	Biloela	23
	Capricorn Coast	82
	Gladstone	88
	Mount Morgan	31
	Rockhampton	346
Darling Downs	Dalby-Tara	28
	Kingaroy	72
	Toowoomba	168
	Warwick	37
Gold Coast	Gold Coast	1,303
Health Contact Centre	SMoCC	1,018
Mackay	Mackay	136
	Proserpine	29
Metro North	Caboolture	295
	Chermside	301
	North Lakes	267
	Redcliffe	112
	The Prince Charles Hospital	24
Metro South	Bayside	323
	Eight Mile Plains	127
	Inala	96
	Logan-Beaudesert	484
	Princess Alexandra Hospital	217
North West	Mt Isa	44
Sunshine Coast	Caloundra	225
	Gympie	144
	Maroochydore	175
	Nambour	137
	Noosa	153
Townsville	Ayr	31
	Ingham	32
	Townsville	294
West Moreton	Ipswich	368
Wide Bay	Hervey Bay	156
	Maryborough	63
Statewide		

Sites with <20 referrals for analysis not displayed

Figure 25: Timely assessment by outpatient program – inpatients

9.3 Timely assessment – non acute patients

This indicator examines the proportion of referrals from the non acute setting which proceed to an assessment within 28 days of referral. The majority of non acute patients (57%) are being assessed in a timely manner, with some notable variation between health services.

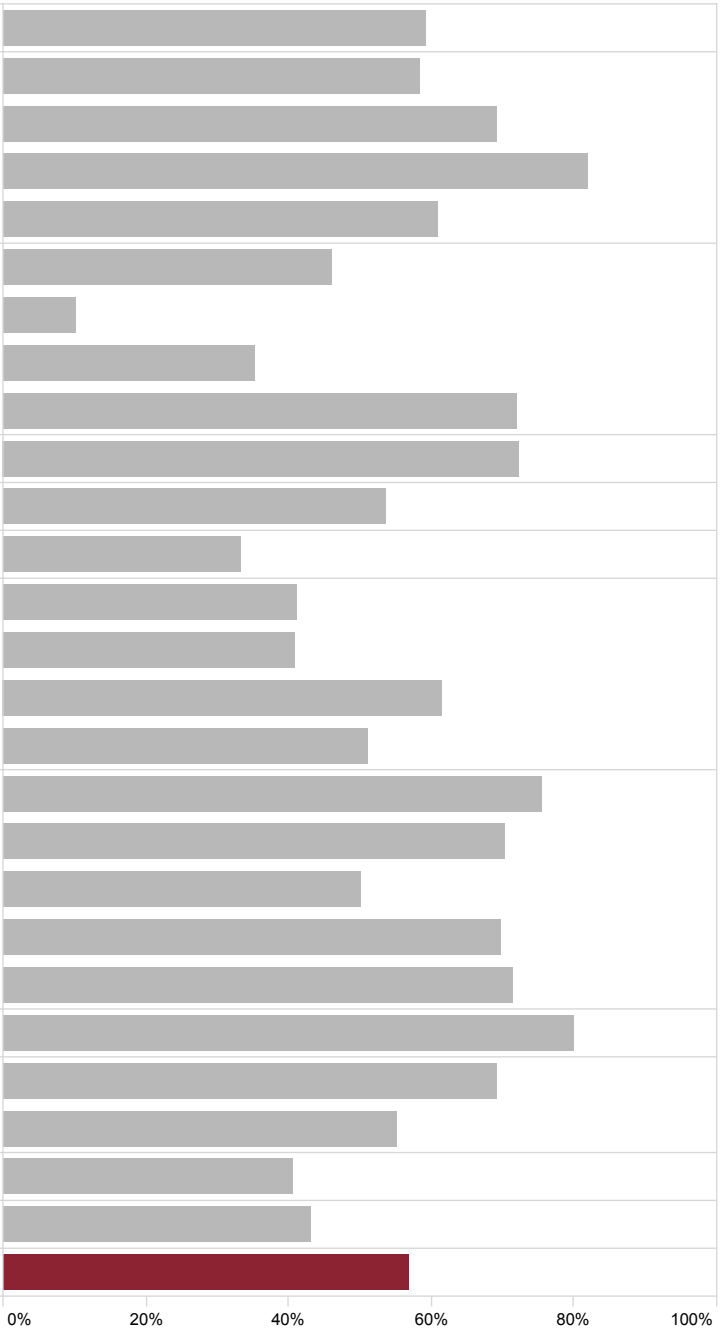
Table 33: Summary of referrals ineligible for timely assessment clinical indicator – non acute patients

Summary	n
Referred outside of Queensland Health	57
Clinically unstable/inappropriate	37
Patient accepted onto an existing program	23
Patient admitted to hospital	10
Patient deceased	4
ALL	**131**

Table 34: Timely assessment indicator by outpatient HHS – non acute patients

Outpatient HHS/division	Total non acute referrals n	Total eligible for analysis n	Target met n (%)
Cairns and Hinterland	67	62	37 (59.7)
Central Queensland	414	403	260 (64.5)
Central West	20	20	16 (80.0)
Darling Downs	151	148	66 (44.6)
Gold Coast	249	210	152 (72.4)
Health Contact Centre	211	194	104 (53.6)
Mackay	110	102	28 (27.5)
Metro North	413	401	198 (49.4)
Metro South	450	436	311 (71.3)
North West	20	20	16 (80.0)
South West	34	34	21 (61.8)
Sunshine Coast	96	90	61 (67.8)
Townsville	111	108	38 (35.2)
West Moreton	393	380	164 (43.2)
Wide Bay	41	41	36 (87.8)
Statewide	**2,780**	**2,649**	**1,508 (56.9)**

Outpatient HHS/division	Outpatient program	Total analysed, n
Cairns and Hinterland	Cairns	27
Central Queensland	Capricorn Coast	67
	Gladstone	87
	Mount Morgan	39
	Rockhampton	202
Darling Downs	Dalby-Tara	39
	Kingaroy	29
	Toowoomba	37
	Warwick	32
Gold Coast	Gold Coast	210
Health Contact Centre	SMoCC	194
Mackay	Mackay	84
Metro North	Caboolture	146
	Chermside	44
	North Lakes	122
	Redcliffe	88
Metro South	Bayside	176
	Eight Mile Plains	74
	Inala	20
	Logan-Beaudesert	138
	Princess Alexandra Hospital	28
North West	Mt Isa	20
Sunshine Coast	Caloundra	29
	Maroochydore	20
Townsville	Townsville	91
West Moreton	Ipswich	380
Statewide		



Sites with <20 referrals for analysis not displayed

Figure 26: Timely assessment by outpatient program – non acute patients

9.4 Timely journey

This patient-centric measure of overall system performance requires strong coordination and links between the referring acute and outpatient CR sites. It measures the proportion of eligible inpatient referrals submitted by the acute site within three days of discharge, as well as the ability of the receiving CR program to meet the target of completing a pre assessment within 28 days of discharge.

Referrals are excluded from the analysis for the reasons outlined in Table 35. The exclusions are applied where information is available and has been documented in the application.

It is important to note that for the purpose of this indicator, any referral which crosses between HHSs is counted for both participating services.

Table 35: Summary of referrals ineligible for timely journey clinical indicator – inpatients

Summary	n
Referred outside of Queensland Health	185
Clinically unstable/inappropriate	162
Same day admission	155
Patient readmitted to hospital	148
Patient accepted onto existing program	58
Patient deceased	29
ALL	**737**

Table 36: Timely journey indicator by participating HHS – inpatients

Participating HHS/ organisation	Total inpatient referrals* n	Total eligible for analysis* n	Target met n (%)
Cairns and Hinterland	822	723	440 (60.9)
Central Queensland	650	567	261 (46.0)
Central West	21	21	15 (71.4)
Darling Downs	383	360	115 (31.9)
Gold Coast	1,387	1,178	760 (64.5)
Health Contact Centre	1,042	918	501 (54.6)
Mackay	177	174	27 (15.5)
Mater Health Services	95	85	52 (61.2)
Metro North	2,128	2,025	1,186 (58.6)
Metro South	1,954	1,891	1,287 (68.1)
North West	44	41	24 (58.5)
South West	28	27	12 (44.4)
Sunshine Coast	998	865	503 (58.2)
Townsville	802	757	330 (43.6)
West Moreton	400	385	257 (66.8)
Wide Bay	293	271	142 (52.4)
Statewide	**8,397**	**7,660**	**4,427 (57.8)**

* Includes both incoming and outgoing referrals

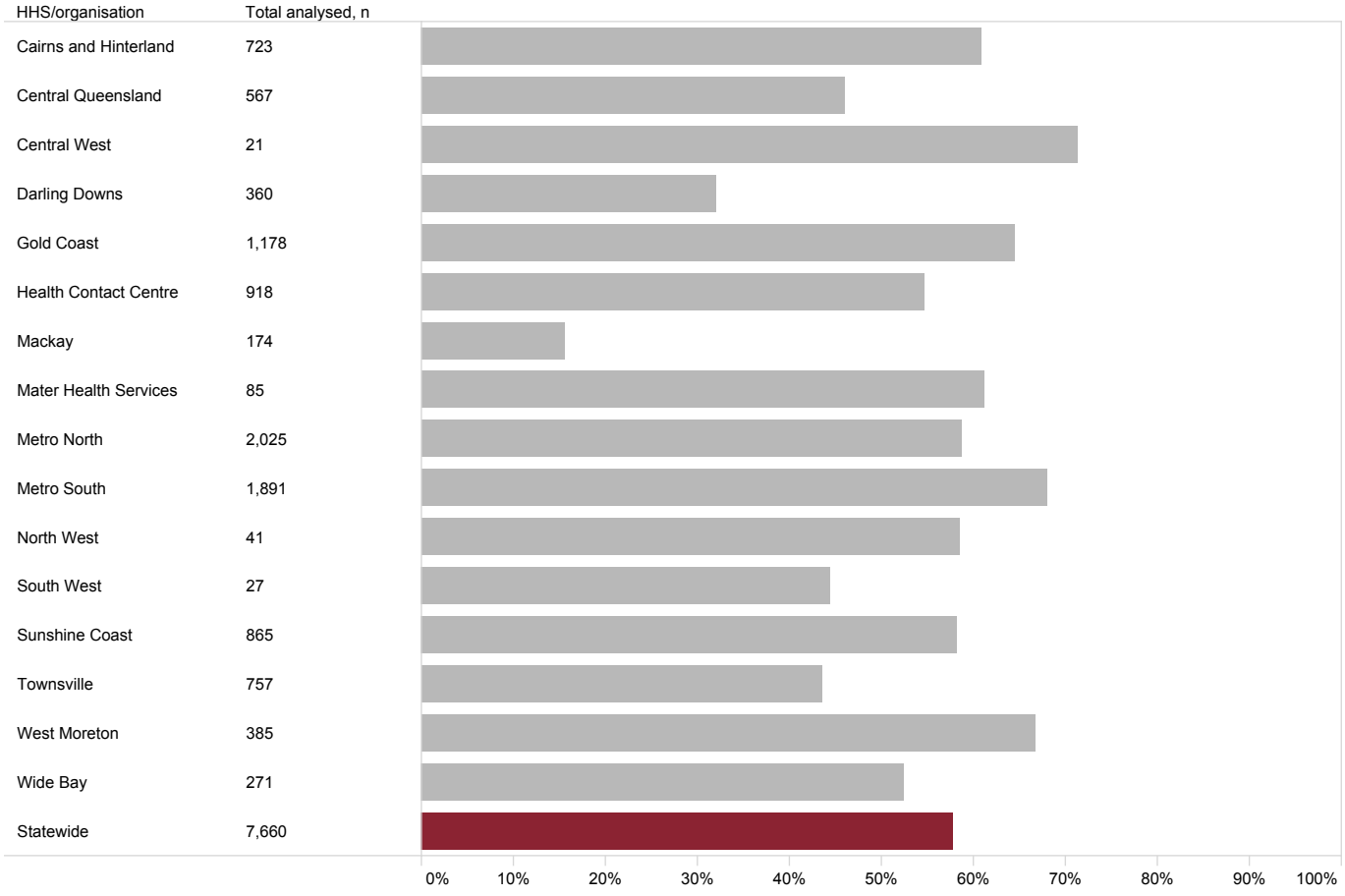


Figure 27: Timely journey indicator by participating HHS – inpatients

References

Cardiac Rehabilitation Audit

[31] Australian Bureau of Statistics. *Causes of death, Australia, 2020. Canberra*: Australian Bureau of Statistics; 2021. https://www.abs.gov.au/statistics/health/causes-death/causes-death-australia/latest-release#leading-causes-of-death-in-aboriginal-and-torres-strait-islander-people (viewed October 2021).

[2] Australian Bureau of Statistics. *Estimates of Aboriginal and Torres Strait Islander Australians*. June 2016. Cat. no 3238.055001. ABS: Canberra; 2018.

[32] Gremeaux, V., Troisgros, O., Benaïm, S., Hannequin, A., Laurent, Y., Casillas, J.-M., & Benaïm, C. (2011). Determining the Minimal Clinically Important Difference for the Six-Minute Walk Test and the 200-Meter Fast-Walk Test During Cardiac Rehabilitation Program in Coronary Artery Disease Patients After Acute Coronary Syndrome. *Archives of Physical Medicine and Rehabilitation, 92*(4), 611–619. doi: 10.1016/j.apmr.2010.11.023.

[33] Kroenke, K., Spitzer, R. L., Williams, J. B., & Lowe, B. (2009). An Ultra-Brief Screening Scale for Anxiety and Depression: The PHQ-4. *Psychosomatics, 50*(6), 613–621. doi: 10.1176/appi.psy.50.6.613.

[34] Hawthorne, G., Korn, S. & Richardson, J. (2013). Population norms for the AQoL derived from the 2007 Australian National Survey of Mental Health and Wellbeing. *Australian and New Zealand Journal of Public Health, 37*(1) 7–16. doi: 10.1111/1753-6405.12004.

Glossary

6MWT	Six Minute Walk Test
ACC	Aristotle Comprehensive Complexity
ACEI	Angiotensin Converting Enzyme Inhibitor
ACP	Advanced Care Paramedic
ACS	Acute Coronary Syndromes
AEP	Accredited Exercise Physiologist
ANZCORS	Australia and New Zealand Congenital Outcomes Registry for Surgery
ANZSCTS	Australian and New Zealand Society of Cardiac and Thoracic Surgeons
AQoL	Assessment of Quality of Life
ARB	Angiotensin II Receptor Blocker
ARF	Acute Rheumatic Fever
ARNI	Angiotensin Receptor-Neprilysin Inhibitors
ASD	Atrial Septal Defect
AV	Atrioventricular
AVNRT	Atrioventricular Nodal Re-entry Tachycardia
BCIS	British Cardiovascular Intervention Society
BiV	Biventricular
BMI	Body Mass Index
BMS	Bare Metal Stent
BNH	Bundaberg Hospital
BSSLTX	Bilateral Sequential Single Lung Transplant
BVS	Bioresorbable Vascular Scaffold
CABG	Coronary Artery Bypass Graft
CAD	Coronary Artery Disease
CBH	Caboolture Hospital
CCL	Cardiac Catheter Laboratory
CCP	Critical Care Paramedic
CH	Cairns Hospital
COVID-19	Coronavirus disease 2019
CI	Clinical Indicator
CPB	Cardiopulmonary Bypass
CR	Cardiac Rehabilitation
CRT	Cardiac Resynchronisation Therapy
CS	Cardiac Surgery
CVA	Cerebrovascular Accident
DAOH	Days Alive and Out of Hospital
DES	Drug Eluting Stent
DOSA	Day of Surgery Admission
DSWI	Deep Sternal Wound Infection
ECG	12 lead Electrocardiograph
ECMO	Extracorporeal membrane oxygenation
ED	Emergency Department
eGFR	Estimated Glomerular Filtration Rate
EP	Electrophysiology
FdECG	First Diagnostic Electrocardiograph
FMC	First Medical Contact
FTR	Failure to Rescue
GAD	Generalized Anxiety Disorder
GCCH	Gold Coast Community Health
GCS	Glasgow Coma Scale
GCUH	Gold Coast University Hospital
GLH	Gladstone Hospital
GP	General Practitioner
GYH	Gympie Hospital
HBH	Hervey Bay Hospital (includes Maryborough)
HCC	Health Contact Centre
HF	Heart Failure
HFpEF	Heart Failure with Preserved Ejection Fraction
HFrEF	Heart Failure with Reduced Ejection Fraction
HFSS	Heart Failure Support Service
HHS	Hospital and Health Service
HOCM	Hypertrophic Obstructive Cardiomyopathy
HSQ	Health Support Queensland
IC	Interventional Cardiology
ICD	Implantable Cardioverter Defibrillator
IE	Infective Endocarditis
IHT	Interhospital Transfer
IPCH	Ipswich Community Health
IVDU	Intravenous Drug Use
LAA	Left Atrial Appendage
LAD	Left Anterior Descending Artery
LCX	Circumflex Artery
LGH	Logan Hospital
LOS	Length Of Stay
LV	Left Ventricle
LVEF	Left Ventricular Ejection Fraction
LVOT	Left Ventricular Outflow Tract
MBH	Mackay Base Hospital
MI	Myocardial Infarction
MIH	Mt Isa Hospital
MKH	Mackay Base Hospital
MRA	Mineralocorticoid Receptor Antagonists
MSSA	Methicillin Susceptible Staphylococcus Aureus
MTHB	Mater Adult Hospital, Brisbane
NCDR	The National Cardiovascular Data Registry

NCR	National Cardiac Registry
NCS	Networked Cardiac Services
NP	Nurse Practitioner
NRBC	Non-Red Blood Cells
NSTEMI	Non-ST Elevation Myocardial Infarction
OR	Odds Ratio
OOHCA	Out of Hospital Cardiac Arrest
ORIF	Open Reduction Internal Fixation
PAH	Princess Alexandra Hospital
PAPVD	Partial Anomalous Pulmonary Venous Drainage
PCI	Percutaneous Coronary Intervention
PDA	Patent Ductus Arteriosus
PFO	Patent Foramen Ovale
PHQ	Patient Health Questionnaire
PICU	Paediatric intensive care unit
PROMS	Patient Reported Outcome Measures
QAS	Queensland Ambulance Service
QCOR	Queensland Cardiac Outcomes Registry
QEII	Queen Elizabeth II Jubilee Hospital
QHAPDC	Queensland Hospital Admitted Patient Data Collection
RBC	Red Blood Cells
RBWH	Royal Brisbane & Women's Hospital
RCA	Right Coronary Artery
RDH	Redcliffe Hospital
RHD	Rheumatic Heart Disease
RKH	Rockhampton Hospital
RLH	Redland Hospital
SCCIU	Statewide Cardiac Clinical Informatics Unit
SCCN	Statewide Cardiac Clinical Network
SCUH	Sunshine Coast University Hospital
SHD	Structural Heart Disease
SMoCC	Self Management of Chronic Conditions
STEMI	ST-Elevation Myocardial Infarction
STS	Society of Thoracic Surgery
TAVR	Transcatheter Aortic Valve Replacement
TMVR	Transcatheter Mitral Valve Replacement
TNM	Tumour, Lymph Node, Metastases
TPCH	The Prince Charles Hospital
TPVR	Transcatheter Pulmonary Valve Replacement
TUH	Townsville University Hospital
TWH	Toowoomba Hospital
VAD	Ventricular Assist Device
VATS	Video Assisted Thoracic Surgery
VCOR	Victorian Cardiac Outcomes Registry
VF	Ventricular Fibrillation
VSD	Ventricular Septal Defect

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